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## INTRODUCTION TO A REVIEW OF THE GENUS *CORVUS*.

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Plates I to XII.

CLASSIFICATION.

SINCE Sharpe (*Cat. B. Brit. Mus.*, iii) in 1877 reviewed the genus *Corvus*, no attempt has been made to revise or bring up to date his work in the light of a more extensive knowledge of the group and a far more comprehensive material for study.

I have included in the genus *Corvus* all forms which appear to be "crows." Sharpe divided what I call *Corvus* into 12 genera, based mainly on shape and development of the nasal bristles, the development of the nostrils and wing formula. In his sub-family "*Corvinae*" he included *Nucifraga*, *Garrulus*, *Cissa*, etc., giving to each genus the same taxonomic status as his genera *Corone*, *Coloeus*, *Trypanocorax*, etc. This seems to me to be wrong, Sharpe using mainly specific characters to define his genera, and on such meagre differences giving the same status to separate for instance *Corone* from *Corax*, as he separates such obviously different genera as *Pica* and *Garrulus*. My ideas of generic differences are extremely wide. Structural differences which do not intergrade to a perfect degree, a great difference in colour pattern, habits, nidification, or colour of eggs would in my opinion justify generic separation, but the main point is the dividing up of birds into natural groups in as convenient form as possible. To arrive at a correct conclusion it is not sufficient to study birds from one geographic area alone, even should that area be a continent. Within the Palaearctic Region it would not be difficult to divide up the *Corvidae* into several recognisable genera, but if all forms from all over the world are studied, it will be seen that there is no hard and fast line by which one genus can be separated from another. Students of any area may well stand aghast at including *Corvus crassirostris* in the same genus as *Corvus monedula*, but if they examine all the intermediate forms they will find it difficult to disagree.

Genus-splitting has of late become a source of confusion to students. Mathews has made many species unrecognisable in a perfect torrent of new genera, and more recently Roberts (*Annals of the Transvaal Museum*, viii, part iv, 1922) has given us a most remarkable essay on genus-splitting. It ill becomes anyone to sit down and subject to severe criticism such hard-thought-out and

excellent work as Roberts has done in South Africa, but the system on which he is working must naturally give rise to misgiving among those of us who struggle to compete with modern nomenclature and classification. He admits that his work must appear to many as a "terrible upheaval." He also admits that though we can hardly find our way through the maze of modern nomenclature, he intends to still further confuse the issue by creating not a little more confusion, in what I can only describe as hopeless and final abandonment of the principle of applying to nature classical names so that the world can understand what we are all talking about. The application of latinised names to nature in order to standardise the taking of an inventory of life in all its forms was initiated as a convenience to students to enable them to classify nature into convenient groups whereby they can be recognised. We are rapidly approaching a condition where it is more convenient to call, at any rate birds, by their trivial popular names, than to use their scientific names. This is partly due to the well-meant energies of those who are constantly striving to change a bird's name by excavating a still older name from some obscure work, and partly to the ever-growing desire to give each species generic status, using for the purpose what I maintain are specific characters. A difference in the number of tail feathers, smaller size and bill, the fact that in one species the sexes are alike and in another they are different, larger size and slightly different colour pattern, colour of bill, length of wing, more rounded wing, slight differences in the length of the first primary, etc., are all actual characters given by Roberts (op. cit.) for the separation of new genera. Every single one of these differences are in general use as separating, not species, but sub-species, and in some cases such differences occur as individual variation. To put such characters to such an improper use as generic characters is to my mind a prostitution of science.

The following genera have been applied to the genus *Corvus* :

<i>Corvus</i>	. . .	Linnaeus 1766	. . . . .	Type : <i>C. corax</i>
<i>Lycus</i>	. . .	Boie 1822 ( <i>nec</i> Fabr. 1787)	. . . . .	<i>C. monedula</i>
<i>Monedula</i>	. . .	Brehm 1828 ( <i>nec</i> Coquebert 1798)	. . . . .	<i>C. monedula</i>
<i>Coloeus</i>	. . .	Kaup 1829	. . . . .	<i>C. monedula</i>
<i>Corone</i>	. . .	Kaup 1829	. . . . .	<i>C. corone</i>
<i>Gymnocorvus</i>	. . .	Lesson 1831	. . . . .	<i>C. tristis</i>
<i>Corvultur</i>	. . .	Lesson 1831	. . . . .	<i>C. albicollis</i>
<i>Frugilegus</i>	. . .	Selys Longchamps 1842	. . . . .	<i>C. frugilegus</i>
<i>Archicorax</i>	. . .	Gloger 1842	. . . . .	<i>C. frugilegus</i>
<i>Amblycorax</i>	. . .	Bonaparte 1853	. . . . .	<i>C. violaceus</i>
<i>Gazzola</i>	. . .	Bonaparte 1854	. . . . .	<i>C. typica</i>
<i>Trypanocorax</i>	. . .	Kaup 1854	. . . . .	<i>C. frugilegus</i>
<i>Pterocorax</i>	. . .	Kaup 1854	. . . . .	<i>C. scapulatus</i>
<i>Physocorax</i>	. . .	Bonaparte 1855	. . . . .	<i>C. moneduloides</i>
<i>Anomalocorax</i>	. . .	Fitz 1863	. . . . .	<i>C. splendens</i>
<i>Gymnocorax</i>	. . .	Sundevall 1872	. . . . .	<i>C. tristis</i>
<i>Heterocorax</i>	. . .	Sharpe 1877	. . . . .	<i>C. capensis</i>
<i>Rhinocorax</i>	. . .	Sharpe 1877	. . . . .	<i>C. rhipidurus</i>
<i>Microcorax</i>	. . .	Sharpe 1877	. . . . .	<i>C. jamaicensis</i>
<i>Macrocorax</i>	. . .	Sharpe 1877	. . . . .	<i>C. fuscicapillus</i>

## MIGRATION.

There is little to be said under this head. A southward movement in winter occurs among those forms which breed in northern climes and appears to be actuated entirely by food motives. The strongest migrants are the Hooded Crow (*Corvus cornix*) and the Rook (*Corvus frugilegus*), but even here the more southerly races of the Hooded Crow are absolute residents (*capellanus* and *sardonius*). The Jackdaws and *Corvus torquatus* are both migrants to a somewhat lesser degree. Migratory movement is fully discussed under those forms to which it applies.

There is no evidence of anything but local movement among those forms inhabiting Africa, Australia, and Southern Asia. In North America migratory movement appears to be ill-defined, but entirely dependent on food.

## THE "HERD" INSTINCT.

The "herd" or "flock" instinct is only fully developed in the Rook (*C. frugilegus*) and the Jackdaws (*C. monedula* and *dauuricus*), the former almost invariably feeding and breeding in company. The Jackdaws do so less frequently, but as a rule breed in colonies. The partiality of jackdaws for the company of rooks is notorious both in the breeding season, when feeding and on migration. Entire flocks of jackdaws on migration is the exception in *Corvus monedula*, but the rule in *Corvus dauuricus*.

Other forms congregate for food or migration, but very rarely for breeding. Purely resident forms show less inclination to flock than migratory forms.

Nearly all forms about which there is evidence flock for roosting, usually preferring a long journey to some neighbouring hills or clump of trees, and this applies equally to resident and migratory forms. In winter in Iraq countless thousands of rooks have been observed roosting on the ground, and many hundreds of Hooded Crows (*C. cornix sharpii*) have been observed collecting to roost in palm-trees at dusk, though the resident form in Iraq (*C. cornix capellanus*) prefers to roost in pairs. In many parts of India both *Corvus corax laurencei* and *Corvus splendens* perform long journeys to hills where they roost in flocks. *Corvus corax tibetanus* roost in large flocks at Leh in Ladak in the poplars of the Residency garden. The same applies to the African members of the genus.

## EVOLUTION.

Environmental influences seem to be mainly, if not entirely, responsible for geographic differences in the genus *Corvus*. The *corax*-group is the most widely distributed, forming an excellent example. The desert and dry-climate forms (*edithae* and *ruficollis*) show a perfect intergradation through *Corvus corax laurencei* to the larger and more brilliant *Corvus c. corax* and *Corvus c. tibetanus*. In all groups subspecific differences are traceable solely to environment, the more brilliant sheen of humid-tropical birds contrasting with the duller sheen of those inhabiting more temperate climates. In the *corax*-, *brachyrhynchos*-, *coronoides*-, *cornix*-, *monedula*-, and *splendens*-groups, variation strictly conforms to the normal laws of environmental influence. Though no Mendelian influence is traceable in the genus, some doubt must remain on two points—the colour of the iris and the shade of white or grey at the bases of the feathers.

In the *coronoides*-group we find that those forms living in the hottest and dampest climates incline to the palest irides, those living in more temperate climates having hazel or dark brown irides. In the same group strictly tropical forms have whiter feather bases than those inhabiting more temperate climes. Similar differences in the shade of the feather bases is noticeable in the *corax*-group. On the other hand we find *Corvus cryptoleucus* with snow-white feather bases living alongside the *corax*- and *brachyrhynchos*-groups in North America. In the East and West Indies we also find white and grey feather-based species in the same region. In tropical Africa all members of the genus have grey feather bases. Regarding the influence of environment on the colour of the iris, it must be remembered that the jackdaw (*Corvus monedula*) breeding from the north of Europe to Algeria and Palestine, has a whitish iris. It is possible that in the one case the cause is environmental and in the other it is Mendelian, or that in the case of the iris of the jackdaw and the feather base of *Corvus cryptoleucus* an environmental influence has become stabilised, and if one believes, as the writer does, that environmental influences can impress the germ plasm and under certain circumstances evolve a true species, the latter explanation appears to be the more satisfactory.

To revert to the colour of the base of the feathers it is noticed that in nearly every group within the genus the shade of colour at the base of the nape feathers is paler or whiter than the shade of colour at the bases of the feathers on any other part of the body. It must also be remembered that a white nuchal collar or patch is a characteristic tendency among crows. In some forms it is well-developed and obvious, whilst in others a white nuchal patch is ill-concealed or entirely concealed by the narrow darker fringes to the feathers. With a pair of scissors it would be an easy matter to give to any specimen of *Corvus cryptoleucus*, *leucognaphalus*, and others a quite natural snow-white nuchal patch or collar.

On external characters *Corvus tristis* appears to be the oldest member of the genus, and probably the nearest living representative of the original *Corvus*, the plumage more closely resembling in its adult stage that of the juveniles of other forms.

#### EXTERNAL CHARACTERS.

*General Colour.*—The general colour of the genus is some shade of black with or without a variable amount of purple, violet, blue, or green iridescence. Those species lacking all trace of iridescence are confined to hot climates. On the other hand, within any species of the genus, those inhabiting tropical areas tend to have more iridescence than those in more temperate climates.

Copper or umber-brown, especially on the nape and neck, are rare variants, and confined to hot climates. When such colours occur, iridescence is reduced. No yellows, reds, or greens occur in the colour pigment of feathers, though such shades show in iridescence.

Large areas of various shades of grey or white are common variants, especially on the nape, hind-neck, mantle, breast, or abdomen. That this variant has a direct connection with the colour of the bases of the feathers is probable, and is more fully dealt with under the heading Evolution. Except in *Corvus tristis*, no grey or white occurs on the forehead, wings, or tail of any member of the genus.

*Dimorphism.*—Fully developed dimorphism occurs only in *Corvus dauuricus*. It is interesting that the nearest form to *C. dauuricus*, namely, *Corvus monedula*, also shows a tendency to dimorphism, especially in its eastern range where the nape and cheeks show any colour from milky-white to grey.

*Wing Formula.*—The first primary is usually between the seventh and eighth, rarely as short as the tenth. The fourth is usually the longest. Complete detail of wing formulae is given in Appendix B.

*Soft Parts.*—Legs and feet always black.

Bill always black except for the ivory-tipped bills of *Corvus albicollis* and *Corvus crassirostris*, the bluish-white bill of *Corvus woodfordi*, and the fleshy-white bill of *Corvus tristis*.

Iris hazel or brown, except in certain tropical forms of *Corvus coronoides*, where it varies from pale grey to pure white (but always brown in immature birds), in *Corvus fuscicapillus*, where the iris is pale blue, in *Corvus monedula* and *dauuricus*, where it is bluish white and greyish brown respectively (but always brown in immature birds), in *Corvus leucognaphalus*, where the iris is reddish brown to orange-red, in *Corvus woodfordi*, where the iris is dirty white, and in *Corvus tristis*, where the iris is blue or bluish white. No record has been found of the irides of *Corvus enca*, *typicus*, *florensis*, *kubaryi*, *validus*, or *hawaiensis*. The evolutionary aspect of the colour of the irides is discussed under the heading Evolution.

*Face and Post-orbital Patch.*—In all members of the genus the face and post-orbital patch or triangle is fully feathered with the following exceptions :

*Corvus enca.*—Face feathered, but with a bare post-orbital patch.

*Corvus unicolor.*—As in the *enca*-group.

*Corvus typica.*—As in the *enca*-group.

*Corvus florensis.*—As in the *enca*-group.

*Corvus nasicus.*—Post-orbital patch, gape and chin naked.

*Corvus frugilegus.*—Face bare, post-orbital patch feathered. In *C. f. pastinator* the extent of bare face is not so large.

*Corvus tristis.*—Face, chin and entire circum-orbital region bare, except for bristles.

*Bill ; General Structure and Nasal Groove.*—The bill in both shape and size displays every variety and intermediate gradation from the massive bill of *Corvus crassirostris*, *Corvus tristis*, *Corvus corax tibetanus* down to the minute stumpy bill of *Corvus monedula* and *dauuricus*.

The upper mandible is arched in *Corvi crassirostris*, *albicollis*, *tristis*, frequently in the *coronoides*-group, *validus*, *unicolor*, *woodfordi*, *meeki*, and very slightly so in the *enca*-group.

The nasal groove in which lies the nostril also shows extreme variation, from the deep-cut groove of *Corvus crassirostris* to no groove at all.

An examination of the 40 plates shows better than any description the various forms of mandible and nasal grooving.

*Nasal Bristles.*—The nasal bristles of the group show every gradation between none at all and bristles reaching to well beyond the proximal half of the culmen. In shape they are from pure fan-shaped to straight or even deflected. In many cases the nostrils are exposed, in some only partially exposed, but in most they are completely covered. Here again, the plates exemplify the differences,

## DISTRIBUTION.

No member of the genus inhabits New Zealand, South America, Madeira, the Azores, and the Mascarene islands or the islands of the South Atlantic and South Pacific. With these exceptions the genus is world-wide in its distribution, ranging as far north as lat. 80 north.

Distribution is fairly evenly spread out, for there are few places in the world, mainly islands and Australia, where only one form exists. In north-east Africa, Europe, Palacarectic Asia, and Palestine it would be possible to see during the course of a day 5 different species of crow. Elsewhere and in America only 4 species could be seen at one time. Taking into consideration the fact that there are 18 continental species of the genus, this is rather remarkable and demonstrates that dispersal took place in very early times, and that the genus is very old-established. Further confirmation of this theory is obtained from the fact that forms occur in Hawaii and other island groups where isolation has had time to evolve a separate species.

## NIDIFICATION.

The members of the genus construct a compact and fairly solid nest, nearly always in a tree or bush, but most of the *corax*-group usually build in cliffs or among rocks, only occasionally in trees or on human habitations. In central Russia the raven often nests on the church towers. *Corvus cornix* also nests in trees or cliffs or even in heather close to the ground. *Corvus corone* nearly always in trees, and but rarely elsewhere. The African members of the group usually nest in trees though occasionally in cliffs, but never close to the ground. *Corvus albicollis* breed in cliffs in South Africa, but in trees in Kenya Colony. The American members of the group usually nest in trees, though often among rocks. The *monedula*- and *dauricus*-groups almost invariably nest in holes in trees or in rock crevices or holes in human habitations. *Corvus frugilegus* breeds very rarely in buildings.

The clutch varies from 4 to 7 in colder climates, but rarely exceeds 5 in warmer climates or in the tropics. In fact 3 eggs seems to be the normal clutch of purely tropical species.

The egg typical of the genus has a ground colour varying from pure pale greenish blue to a dirty olive-green. A fair amount of gloss is apparent. Unmarked eggs are very rare, the whole surface being usually spotted, blotched or streaked with greenish brown, blackish brown, or olive-brown, with often underlying lavender markings. Increased pigmentation at the larger half of the egg is rare but occurs. Variation is great even in the same clutch.

Erythristic eggs are rare, but occasionally occur in the *corax*-, *cornix*-, *frugilegus*-, and *brachyrhynchos*-groups. *Corvus capensis* invariably lays eggs of a red type.

Variants from the above occur as follows :

*Corvus capensis*.—Ground colour salmon-pink to pale creamy pink blotched and spotted with terra-cotta, showing great variation from overall speckling to large occasional blotches ; 23 clutches examined.

*Corvus cryptoleucus*.—Paler than type, though they can be matched. More sparingly marked. 8 eggs seen.

*Corvus torquatus*.—Very heavily marked, but occasionally typical. So heavily marked are some eggs that they present a uniform greenish-olive appearance. 14 clutches examined.

*Corvus coronoides philippinus*.—One clutch very pale and sparingly marked. The other densely marked.

*Corvus enca pusillus*.—One examined from oviduct is of the *Corvus monedula* type, but considering its origin must be an unreliable guide.

*Corvus monedula* and *dauricus*.—Ground colour bluer than type and less densely marked. These being the only members of the group which almost invariably nest in holes or crevices, it is not surprising to find their eggs paler and more conspicuous than those whose eggs are exposed to sunlight.

Eggs of the following species have not been examined :

<i>Corvus crassirostris</i> .	<i>Corvus typicus</i> .
<i>Corvus tristis</i> .	<i>Corvus nasicus</i> .
<i>Corvus fuscicapillus</i> .	<i>Corvus woodfordi</i> .
<i>Corvus hawaiiensis</i> .	<i>Corvus meeki</i> .
<i>Corvus jamaicensis</i> .	<i>Corvus kubaryi</i> .
<i>Corvus leucognathus</i> .	<i>Corvus validus</i> .
<i>Corvus florensis</i> .	

#### MOULT.

The *Corvidae* have one annual moult which occurs in late summer and autumn in the Northern Hemisphere. The earliest moult occurs in *Corvus monedula*, which commences moulting in June. Other palaeartic crows rarely show signs of moult until August, though some, such as *Corvus corax tibetanus*, appear to have completed their moult by late July or early August. Eight specimens shot in Ladak between April 17 and May 7 had 5, 6, and 7 primaries in sheath, and were commencing body moult. Central rectrices in sheath. *Corvus corax ruficollis* varies much in the date of moult in the different parts of its range. In Somaliland moult is complete by early November, though in Palestine it is complete by late September. In the *Corvus cornix* group, birds from northern Europe have completed their moult before migration, sometime in September, but in Crete and Egypt moult is complete by late August.

There is very little material on which to base any useful note on the moult of tropical members of the group. In South Africa *Corvus capensis* shows examples of primary moult in March and of the initial stages of body moult in May. I have seen specimens of *Corvus albus* showing signs of moult in every month of the year. In the *Corvus coronoides*-group moult seems to occur in late autumn (October) in the northern forms, and almost throughout the year in tropical forms.

#### FIGURES.

1. ♂ *Corvus tristis* . . . . New Guinea (B.M. 1916.5.30.1404)
2. ♀ *Corvus hawaiiensis* . . . . Hawaii (B.M. 97.10.28.1)
3. ♂ *Corvus fuscicapillus* . . . . Aru (B.M. 58.3.10.17)
4. ○ *Corvus validus* . . . . Batehian (B.M. 96.1.7.100)
5. ○ *Corvus enca pusillus* . . . . Mindoro (B.M. 96.6.6.15)

6. ♂ *Corvus enca compilerator* . . . Mindoro (B.M. 1.69.13.17)  
 7. ♀ *Corvus typicus* . . . Macassar (B.M. 73.5.12.2000)  
 8. ♂ *Corvus unicolor* . . . Banggai Islands (Tring)  
 9. ♀ *Corvus florensis* . . . Flores (Tring)  
 10. ♀ *Corvus kubaryi* . . . Guam (B.M. 18.4.29.26)  
 11. ♂ *Corvus meeki* . . . Bougainville (B.M. 1909.2.18.8)  
 12. ♀ *Corvus w. woodfordi* . . . Guadalcanar (B.M. 88.2.7.47)  
 13. ♂ *Corvus moneduloides* . . . New Caledonia (B.M. 97.6.1.73)  
 14. ♂ *Corvus monedula spermologus* . . . Scotland (B.M. 1912.4.7.1)  
 15. ♂ *Corvus coronoides japonensis* . . . Nagasaki (B.M. 87.11.20.78)  
 16. ♂ *Corvus coronoides intermedius* . . . Simla (B.M. 86.3.1.314)  
 17. ♀ *Corvus mexicanus ossifragus* . . . Washington (B.M. 88.10.10.637)  
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 20. ♀ *Corvus brachyrhynchus palmarum* . . . San Domingo (B.M. 1923.10.24.1)  
 21. ♂ *Corvus capensis capensis* . . . Klipfontein (B.M. 1905.12.29.550)  
 22. ♂ *Corvus f. frugilegus* . . . Rome (B.M. 1905.6.28.872)  
 23. ♂ *Corvus frugilegus pastinator* . . . Yakutsch (B.M. 75.3.15.4)  
 24. ♂ *Corvus leucognaphalus* . . . Porto Rico (B.M. 1905.6.28.873)  
 25. ♀ *Corvus nasicus* . . . Cuba (Meinertzhagen coll.)  
 26. ♂ *Corvus jamaicensis* . . . Jamaica (B.M. 42.12.29.48)  
 27. ♂ *Corvus rhipidurus* . . . Suakin (B.M. 1915.12.24.520)  
 28. ♂ *Corvus crassirostris* . . . Abyssinia (B.M. 61.5.8.55)  
 29. ♂ *Corvus albicollis* . . . Orange River Colony (B.M. 1904.4.1.2)  
 30. ♂ *Corvus cryptoleucus* . . . Mexico (B.M. 90.5.30.11)  
 31. ♀ *Corvus corax corax* . . . Trebizond, Black Sea  
     (B.M. 1909.11.18.34)  
 32. ♀ *Corvus corax tingitanus* . . . Tangier (B.M. 1905.6.28.857)  
 33. ♂ *Corvus corax laurencei* . . . Sambhur, India (B.M. 86.3.1.63)  
 34. ♂ *Corvus corax ruficollis* . . . Jerusalem (B.M. 1905.6.28.860)  
 35. ♂ *Corvus corax edithae* . . . Sheikh, Somaliland (B.M. 1918.6.6.20)  
 36. ♀ *Corvus splendens splendens* . . . India (B.M. 86.3.1.262)  
 37. ♂ *Corvus cornix cornix* . . . England (B.M. 1916.9.20.99)  
 38. ♂ *Corvus corone orientalis* . . . N.W. India (B.M. 1908.11.10.24)  
 39. ♂ *Corvus torquatus* . . . Foochow, China (B.M. 1902.8.5.72)  
 40. ♀ *Corvus albus* . . . Manda I., Kenya Colony  
     (B.M. 87.11.3.16)

In the following review of the genus, 33 species, comprising 86 geographical forms, are recognised. These are :

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A complete list of synonyms which have been applied to species and races is given in Appendix A.

#### KEY TO THE GENUS *CORVUS*.

	Page.
1. Surface of plumage without any distinct pure white area <sup>1</sup> . . . . .	7
Surface of plumage with a distinct pure white area . . . . .	2
2. Wing over 385 mm. Bill very deep and tipped with white . . . . .	3
Bill slenderer and not white-tipped. Wing under 385 mm. . . . .	4
3. Nape white . . . . .	<i>crassirostris</i>
Nape not white . . . . .	<i>albicollis</i>
4. Wing over 300 mm. . . . .	5
Wing under 300 mm. . . . .	6

<sup>1</sup> Worn examples of *C. cornix capellanus* are whitish, but never pure white.

	Page.
5. Breast white, abdomen black . . . . .	albus
Breast and abdomen black, with a broad white horseshoe band across the former. . . . .	<i>torquatus</i>
6. Culmen under 35 mm. . . . .	<i>dauuricus</i> <sup>1</sup>
Culmen over 35 mm. . . . .	<i>typicus</i>
7. Plumage with grey, greyish white, or pale brown areas . . . . .	8
Plumage dull black, or lead-black, or black glossed with some metallic sheen of blue, violet, green, or purple or copper. Never with grey, greyish white, or pale brown areas . . . . .	12
8. Crown glossy blue-black . . . . .	9
Crown glossless and never black . . . . .	<i>tristis</i>
9. Culmen under 40 mm. . . . .	10
Culmen over 40 mm. . . . .	11
10. Abdomen lead-grey or lead-black . . . . .	<i>monedula</i>
Abdomen dirty ash-grey or dirty black . . . . .	<i>dauuricus</i> <sup>2</sup>
11. Mantle glossy blue-black . . . . .	<i>splendens</i>
Mantle grey or whitish . . . . .	<i>cornix</i>
12. Nasal bristles fan-shaped . . . . .	<i>rhipidurus</i>
Nasal bristles not fan-shaped . . . . .	13
13. First or outside primary shorter than the eighth . . . . .	15
First or outside primary equal to or longer than the eighth . . . . .	14
14. Base of feathers snow-white. Throat, feathers not elongated or lanceolated . . . . .	<i>cryptoleucus</i>
Base of feathers grey to whitish. Throat, feathers elongated and lanceolated . . . . .	<i>corax</i>
15. Nostrils entirely uncovered by bristles . . . . .	16
Nostrils concealed or nearly so by bristles . . . . .	17
16. Under-parts violet-purple. Post-ocular region feathered. Larger <i>frugilegus</i> <sup>3</sup> Under-parts black glossed with deep violet. Post-ocular region naked. Smaller . . . . .	<i>nasicus</i>
17. Head and neck copper brown . . . . .	<i>fuscicapillus</i>
Head and neck not copper-brown . . . . .	18
18. Culmen at its frontal base not covered by bristles, though edged by short tufty feathers . . . . .	19
Culmen at its frontal base covered by nasal or frontal bristles . . . . .	21
19. Bill black . . . . .	<i>enca</i>
Bill not black . . . . .	<i>woodfordi</i>
20. Mantle glossed with some shade of green, violet, or blue . . . . .	22
Mantle glossless . . . . .	21
21. Wing over 280 mm. . . . .	<i>hawaiiensis</i>
Wing under 250 mm. . . . .	<i>jamaicensis</i>
22. Cutting edges of both mandibles in a straight line from gape to tips of mandibles . . . . .	<i>moneduloides</i>
Cutting edges of mandibles never in a straight line from gape to tip . . . . .	23
23. Mantle with a distinct blue, purple, or violet gloss . . . . .	24

<sup>1</sup> Pied phase.

<sup>2</sup> Dark phase.

<sup>3</sup> In the immature of *Corvus frugilegus* the nostrils are covered. The violet-purple plumage, wing formula and locality will then form easy distinguishing features.

	Page.
Mantle blackish with a mere trace of a purplish sheen which is very indistinct . . . . .	<i>kubaryi</i>
24. Nasal bristles about one-third of the whole length of the culmen. . . . .	25
Nasal bristles about one-half the total length of the culmen . . . . .	26
25. Base of nape feathers dark grey . . . . .	<i>capensis</i>
Base of nape feathers white . . . . .	<i>leucognaphalus</i>
26. Head and nape bright metallic blue-green in marked contrast to a violet mantle . . . . .	<i>meeki</i>
Head and nape never bright metallic blue-green, though sometimes dull oily green and not in marked contrast to the colour of the mantle . . . . .	27
27. Base of feathers snow-white. Culmen over 70 mm. and strongly arched. Nape, neck and mantle uniform violet . . . . .	<i>validus</i>
Base of feathers seldom snow-white, or when they are, as in some races or <i>C. coronoides</i> , the culmen is then well under 70 mm. long. Culmen not strongly arched, or more frequently not arched . . . . .	28
28. Throat feathers elongated and showing distinct signs of lanceolation, sometimes but slightly so . . . . .	29
Throat feathers not elongated and without lanceolation . . . . .	30
29. Culmen usually and slightly arched in its centre. Nasal bristles usually not directed up so as to cover the basal half of the culmen. Base of nape feathers from dark grey to snow-white. All races of <i>Corvus coronoides</i> which occur on the Asiatic Mainland show a distinct greenish tinge on the head, nape and under-parts . . . . .	<i>coronoides</i>
Culmen never arched. Nasal bristles usually directed up to cover the basal half of the culmen. Base of nape feathers always dark grey. Never any greenish tinge on the plumage which is purplish on the head, nape and under-parts . . . . .	<i>corone</i>
30. 2nd primary shorter than the 8th . . . . .	<i>florensis</i>
2nd primary longer than the 8th . . . . .	31
31. Under-parts distinctly glossed with greenish. <sup>1</sup> Forehead more violet than the blue of the back . . . . .	<i>mexicanus</i>
Never any trace of green on the under-parts. Forehead and back strictly uniform . . . . .	<i>brachyrhynchus</i>

### Corvus tristis.

*Corvus tristis* Lesson and Garnot, *Bull. Sci. Nat. Férussac*, x, p. 291, 1827 (cf. Mathews, *Ibis*, 1916, p. 295).

*Corvus senex* Lesson, *Voy. Coquille Ois*, p. 650, 1828 (not 1826), teste Mathews *Austr. Av. Record*, ii, p. 52. Dorey, New Guinea.

47 examined.

*Adults*.—From my examination of the above series I am convinced that the pale birds are the adults and the darker birds are the young, though I admit this is by no means certain.

<sup>1</sup> This greenish tinge is not always apparent in *Corvus mexicanus ossifragus* unless specimens are compared. Even then the differences between *C. m. ossifragus* and *Corvus brachyrhynchus palmarum* are not always apparent.

A most untidy and variable bird. In freshly-moulted plumage they vary from dull purplish and slightly glossy violet above to pale brown with a whitish head. Under-parts vary from dull brownish black to pale hair-brown. In all cases the bases of the nape feathers are white. Lanceolation of throat feathers absent. Nasal bristles scant leaving nostrils uncovered. Face almost bare. Culmen strong and highly arched.

*Immature*.—Dull violet-brown, duller and paler on the head and neck. Under-parts hair-brown. Nasal bristles well developed and almost covering nostrils. Face covered with bristle-like feathers.

*Soft Parts*.—Iris blue or whitish blue. Bill fleshy white with or without a blackish tip. Feet flesh to pale horn.

*Measurements*.—Wing 306–350, culmen length 61–75, height 26–29 mm.

*Distribution*.—Apparently the whole of New Guinea, both on the coast and in the hills. Birds examined from Konstantinhafen, Owen Stanley Range, Snow Mountains, Sattelberg, Dorey, Astrolabe River, Port Moresby, and Humboldt's Bay. Also Salwatti, Waigiu, Goodenough, Fergusson, and Jobi Islands.

### **Corvus hawaiiensis.**

*Corvus tropicus* Bloxham in *Byron's Voy.*, p. 250, 1826. Sandwich Islands. Nomen nudum.

*Corvus hawaiiensis* Peale, *U.S. Explor. Exped. Orn.*, p. 106, 1848. Karakakna Bay, Hawaii.

18 examined.

*Adults*.—General colour of plumage dull lead colour without gloss, but with traces of a violet tinge, especially on the head. Primaries dark hair-brown. Base of nape feathers dove-grey. Throat feathers hair-like with stiff shafts. No trace of lanceolation. Nasal bristles cover the nostrils and are inclined to be fan-shaped. They extend to half-way along the culmen barely covering its frontal base. Bill strong and stumpy.

*Soft Parts*.—No record.

*Measurements*.—Wing 286–321, culmen length 54–63, height 26–28 mm.

*Distribution*.—Sandwich Islands.

### **Corvus fuscicapillus.**

*Corvus fuscicapillus* G. R. Gray, *P.Z.S.*, 1859, p. 157. Dorey, New Guinea.

8 examined.

*Adults*.—Whole head and neck brownish, slightly tinged with violet. Remainder of upper-parts glossy violet-blue. Under-parts dark violet. Bill massive with strongly curved maxilla. Nostril groove ill-developed, the nasal bristles barely covering the nostrils and scarcely reaching to half-way along the culmen. Ridge of culmen at base covered by minute bristles. Bases of nape feathers snow-white. Lanceolation of throat feathers absent.

*Immature*.—None examined. Described by Hartert as "whitish, then more or less dusky."

*Soft Parts*.—Iris pale to ultramarine blue. Bill and feet black.

*Measurements*.—Wing 328–344, culmen length 78–79, height 27 mm.

*Distribution*.—Waigiu, Aru Islands, and extreme west of Dutch New Guinea.

### Corvus validus.

*Corvus validus* Bonaparte (ex Temm. MS.), *Consp. Ar.*, p. 385, 1850. Ceram, Gilolo. Salvadori (*Ornith. Papuasia*, ii, p. 493) states there is no such specimen in the Leyden Museum, whence Bonaparte described the bird, from Gilolo or Ceram, but that *C. validus* inhabits Sumatra, Java, and perhaps Timor. On this account authors have usually accepted this name as a synonym of one of the *enca*-group.

But Büttikofer (*Notes Leyden Mus.*, 1897, p. 185) definitely states that the type is in the Leyden Museum and that it came from Halmahera (Gilolo). He also states that the types of *validus* and *validissimus* are one and the same bird, "*validus*" having been erased by Temminck himself, and the name "*validissimus*" substituted in its stead. If this is correct—and I think we must accept it—*validus* must take priority over *validissimus*. As there is but one member of the Crow family in Halmahera, there can be no confusion as to which is intended.

*Corvus validissimus* Schlegel, *Bijdr. Dierk. Amsterdam*, pt. 8, p. 12, 1859. Dodingo, Gilolo, Molucca Islands.

13 examined.

*Adults*.—Upper-parts range from greenish steel-blue on the forehead to violet on the nape and neck, and violet-purple on the wings, back and tail. Lower parts suffused with violet. Throat and chin greenish steel-blue. Bases of nape feathers snow-white. Bill strong and well arched. Nasal bristles well developed, covering the frontal base of the culmen as in the *coronoides*-group, straight and reaching to half-way along culmen. Nostrils in ill-developed groove.

*Soft Parts*.—No record.

*Measurements*.—Wing 330–362, culmen length 72–83, height 25–28.

*Distribution*.—Halmahera (Gilolo). Also Obi, Batehian, and Morty Is. *C. validus* is closely allied to the *enca*-group, but its massive and differently-shaped bill seems to give it specific rank.

### Corvus enca.

This group differs from the *coronoides*-group in having a distinct violet tinge on the under-parts, which is invariably absent in the *coronoides*-group. The bases of the nape feathers are invariably white. The bird is usually smaller with a slenderer bill. The throat feathers are less lanceolated. The frontal base of the culmen is invariably bare, whereas in the *coronoides*-group it is invariably concealed by nasal bristles.

Post-ocular region usually bare.

This group is restricted in distribution to an area bounded on the west by the Malay Peninsula and Sumatra, to Java, Celebes, Ceram, Palawan, and the Philippine Group. Except in Celebes, Palawan, and Ceram, members of the group live alongside one or other of the forms of the *coronoides*-group. It seems possible that in Java and Sumatra a certain amount of hybridisation occurs between these two groups.

### Corvus enca compiler.

*Corvus tenuirostris* Moore, *Cat. B. Mus. E. Ind. Comp.*, ii, p. 558, 1858 (nec Brehm 1855). Type examined. The bird was collected by Kittoe and the locality on the label is "Bombay." Wing 312, culmen length 65, height 23 mm. There is no doubt about the bird belonging to this race of *enca*. Blyth (*Ibis*, 1863, p. 368) gives the locality as Malacca.

? *Corvus fallax* Brüggemann, *Abhandl. Ver. Bremen*, v, p. 76, 1878. Species indeterminable. Described from a Rosenberg skin without locality. Wing 335-340, culmen length 65, height 22 mm. Base of feathers whitish grey.

*Corvus compiler* nom. nov. Richmond, *Proc. U.S. Nat. Mus.*, xxvi, p. 518, 1903.

31 examined.

*Adults*.—Above glossy violet purple. Below a paler and duller violet-black.

Base of nape feathers white.

*Soft Parts*.—No record.

*Measurements*.

Specimens	Locality.	Wing.	Culmen. Length.	Height.
3	Straits Settlements . . .	315-322	67	21-22
13	Sumatra . . . . .	282-334	56-68	21-25
13	Borneo . . . . .	282-344	57-71	22-27
2	Labuan . . . . .	297, 312	62	22

The following measurements are given by Kloss :

Specimens.	Locality.	Wing.	Height of Culmen.
6	Perak, Pahang, and Selangor	304-324	20-22.7
9	Sumatra . . . . .	298-322	20.5-23
2	Borneo . . . . .	308-315	22, 23

*Distribution*.—Malay Peninsula (Johore, Selangor, Penang, Pahang), where they are less common than the *coronoides* representative. Sumatra, Borneo, and Labuan. Also Simalur and Nias Islands, west of Sumatra.

**Corvus enca enca.**

*Fregilus enca* Horsfield, *Trans. Linn. Soc*, xiii, p. 164, 1822. Java.

8 examined, including the type.

*Adults*.—Smaller than *compiler*, otherwise identical.

*Soft Parts*.—" Iris dark, bill and feet black " (Kloss).

*Measurements*.—Wing 270-299, culmen length 55-59, height 20-22.

Kloss gives the wings of 4 Javan specimens as 272-282, and height of culmen as 16.5 to 19 mm.

There is a bird in the British Museum, which is possibly a hybrid with *C. coronoides macrorhynchus*, having a wing 342, culmen length 66 and height 26 mm.

*Distribution*.—Java. Mentawi Islands, west of Sumatra (Kloss, *Ibis*, 1926, p. 293).

**Corvus enca subsp.**

32 examined.

*Adults*.—Near *C. e. enca*, but even smaller, and generally darker. Bases of nape feathers white. Differences not sufficiently constant to warrant separation.

*Measurements*.—Wing 259-296, but mainly between 259 and 284. Culmen length 50-56.57, height 19-22 mm.

*Distribution*.—Birds examined from Celebes (27), Bali (1), and Sula Islands (4).

**Corvus enca violaceus.**

*Corvus violaceus* Bonaparte, *Consp. Av.*, i, p. 384, 1850. Ceram.

*Corvus modestus* Brügg., *Abhandl. Natur. Verein Bremen*, v, p. 77, fig. iii, 1876, no locality. Type in the Darmstadt Museum. A young bird (*teste* Stresemann, *Nor. Zool.* xxi, p. 153).

14 examined.

*Adults*.—Duller and less glossy violet-blue on the upper and under-parts than either *C. e. enca* or *compilator*. There are traces only of gloss on the forehead and crown. Bases of nape feathers white. No lanceolation of throat feathers.

*Measurements*.—Wing 233–250, culmen length 45–50, height 19–21 mm.

*Distribution*.—Apparently confined to Ceram.

**Corvus enca pusillus.**

*Corvus pusillus* Tweeddale, *P.Z.S.*, 1878, p. 622. Puerto Princeza, Palawan.

8 examined, including the type.

*Adults*.—Similar to *violaceus*, but a paler and greyer violet below, and an intenser violet above. A slight sheen on plumage.

*Measurements*.—Wing 225–251, culmen length 48–52, height 19–20 mm.

*Distribution*.—Palawan and Balabac Islands.

**Corvus enca subsp.**

5 examined.

*Adults*.—Generally glossier than either *pusillus*, *violaceus* or subsp. ?, especially on the crown and forehead.

*Measurements*.—Wing 231–250, culmen length 49–52, height 20–22 mm.

*Distribution*.—Apparently confined to Mindoro.

**Corvus enca samarensis.**

*Corvus samarensis* Steere, *List Birds and Mammals, Steere Exped.*, p. 23, 1890. Samar, Philippines.

2 examined, including the type.

*Adult*.—General plumage a deep violet-blue with a strong sheen.

*Measurements*.—1 from Samar (type) wing 225, culmen length 52, height 22 mm. 1 from S. Mindanao, wing 214, culmen length 47, height 22 mm.

**Corvus typicus.**

*Gazzola typica* Bonaparte, *Compt. Rend.* xxxvii, p. 828, 1853. The type undoubtedly came from Celebes. See Meyer and Wiglesw. *B. Celebes*, ii, p. 584.

*Corvus advena* Schlegel (nec Brehm), *Bijdr. Dierk. Amsterdam* fol. sp. *Corvus*, p. 3, pl. ii, 1848–54. Sumatra (in error).

9 examined.

*Adults*.—Head glossy deep blue-black, inclining to brownish on the throat. A broad collar and under-parts to vent, white. Remainder of upper-parts, wings, vent and tail, dull glossy blue or purplish black. No lanceolation on



throat feathers. Nasal bristles ill-developed and not completely covering nostrils. Post-ocular triangle bare.

*Soft Parts*.—No record.

*Measurements*.—Wing 199–217, culmen length 42–45, height 19–20 mm.

*Distribution*.—Apparently confined to the South-east Peninsula of Celebes. Birds examined from Macassar, Indrulaman, and Bonthain Peak, 6,000 ft.

### **Corvus unicolor.**

*Gazzola unicolor* Rothschild and Hartert, *Bull. B.O.C.* xi, p. 29, Nov. 1900. Banggai, Sula Islands, east of Celebes.

2 examined, including the type. Both these specimens are in the Tring Museum and appear to be "trade" skins prepared by natives, neither having any reliable data attached. There are no specimens in the British Museum. Perhaps a race of *Corvus enca*.

*Adult*.—Whole plumage glossy deep blue-black, intenser on the forehead and duller on the under-parts. Nasal bristles ill-developed, and only just covering nostrils. Ridge of culmen bare at base. Tail very short (104–109) and falling far short of tips of wings.

*Measurements*.—Wing 205.208, culmen length 45.43, height 21.19 mm.

*Distribution*.—Banggai ?

### **Corvus florensis.**

*Corvus florensis* Büttikofer in Max Weber's *Reise Nederl. Ind.*, p. 304, 1894. Flores.

1 examined, collected by A. Everett, at Tring. The specimen is a female with wing 227, culmen length 45.5, height 20 mm. Similar to the *enca*-group, but the nasal bristles are better developed and completely cover the frontal base of the culmen. Nostrils in a deep groove. General plumage a clearer and purer violet than any of the *enca*-group, and lacking the bluish tinge of the latter. Post-ocular region bare. Probably a race of the *enca*-group.

*Distribution*.—Only 2 specimens known from Flores.

### **Corvus kubaryi.**

*Corvus kubaryi* Reichenow, *J. f. O.*, 1885, p. 110. Type at Berlin with a wing of 225 mm. It is said to have been collected by Kubary at Pelew Island, but as this bird has not since been obtained on the island, it seems more likely that it came from the neighbouring Caroline or Marianne Groups, whence birds prove to be identical with Reichenow's type (cf. Hartert, *Novit. Zool.* v, p. 59).

15 examined, including the type.

*Adults*.—All specimens which I have examined are in such a poor state that an accurate description would be impossible. They are possibly all in immature plumage. General plumage dull and almost without gloss. Head dull greenish-black, back dull purplish blue-black. Under-parts dull greenish black. Base of nape feathers white. No lanceolation to throat feathers. Nasal bristles short, but covering nostrils and the base of ridge of the culmen. Bill slender, as in the *enca*-group.

*Soft Parts*.—

*Measurements*.—Wing 217–243, culmen length 47–55, height 19–23 mm.

*Distribution*.—Birds examined from Guam (Marianne Group) and the Caroline Islands. Probably does not occur on Pelew I.

**Corvus meeki.**

*Corvus meeki* Rothschild, *Bull. B.O.C.* xv, p. 21, 1904. Bougainville, Solomon Islands.

9 examined, including the type.

*Adults.*—Similar to the *woodfordi*-group, but with very intense gloss, the greenish blue of the head being replaced by greenish purple. Under-parts glossy purple. Bases of nape feathers whitish. Culmen heavy and strongly curved. Nasal bristles, unlike the *woodfordi*-group, meet over the ridge of the culmen.

*Soft Parts.*—Iris brown, bill and feet black.

*Measurements.*—Wing 265–300, culmen length 64–72, height 25–28 mm.

*Distribution.*—Apparently confined to Bougainville of the Solomon Group. Though at first sight this species seems a geographical race of the *woodfordi*-group, the different colour of the head, glossy under-parts, colour of iris, and the meeting of the nasal bristles over the culmen would seem to give it specific rank.

**Corvus woodfordi vegetus.**

*Macrororax vegetus*, Tristram, *Ibis*, 1894, p. 30. Bugotu, Solomon Islands.

8 examined.

*Adults.*—Head and neck glossy greenish blue, the rest of the upper-parts purplish blue. Under-parts almost glossless greenish blue. Bases of nape feathers whitish. Culmen massive and strongly curved. Nasal bristles reach to half-way along culmen, but do not cover the vertex.

*Soft Parts.*—Iris dirty white, feet black, bill milky-white with pinkish tint and a black tip.

*Measurements.*—Wing 280–299, culmen length 63–70, height 27–30 mm.

*Distribution.*—Isabel Island, Solomon Group.

**Corvus woodfordi woodfordi.**

*Macrororax woodfordi* Ogilvie Grant, *P.Z.S.*, 1887, p. 332. Guadalcanar, Solomon Islands.

15 examined.

*Adults.*—Similar to *vegetus*, but with an intenser sheen and generally more brilliantly coloured. Occasional traces of purplish on the crown. Under-parts as in *vegetus*. Bases of nape feathers whitish. Nasal bristles as in *vegetus*.

*Soft Parts.*—Iris dirty white to grey, feet black, bill bluish white with a pinkish tint and a black tip.

*Measurements.*—Wing 265–290, culmen length 59–65, height 25–27.

*Distribution.*—Guadalecanar and Choiseul, Solomon Islands.

**Corvus moneduloides.**

*Corvus moneduloides* Lesson, *Traité*, p. 329, 1831, no locality. I cite New Caledonia as type locality.

12 examined.

*Adults.*—Whole plumage glossy violet-blue, inclining to a deeper and more purplish tint on the head. Bases of nape feathers dark grey. Bill stumpy and not unlike that of the jackdaw (*C. monedula*), the lower mandible curving up sharply towards the tip. Nasal bristles straight and completely covering the nostrils, which lie in a groove. Ridge at base of culmen covered. No lanceolation of throat feathers. Upper mandible straight and with but slight curve.

*Soft Parts.*—No record.

*Measurements.*—Wing 238–260, culmen length 39–50, height 19–22 mm.

*Distribution.*—Apparently confined to New Caledonia.

### **Corvus monedula monedula.**

*Corvus monedula* Linn. *Syst. Nat.* ed. x, p. 106, 1758. Sweden.

*Adults.*—Plumage generally black glossed with deep purplish blue on the crown. Ear coverts, nape, hind-neck, and sides of face pale lead-grey. Mantle lead-black glossed with blue. Secondaries and wing-coverts with a purple gloss. Under-parts dark ash-grey. Base of nape feathers grey. Bill short and stumpy, with but little curve on the cutting edges of the mandibles. Nostrils in a pit, not in a groove. Nasal bristles well developed and reaching to beyond proximal half of culmen.

*Immature.*—Generally a browner bird with less gloss.

*Soft Parts.*—Iris in adults bluish white, in immature birds brown. Bill of adults black in immature birds brown. Feet black in both adults and immature birds.

*Measurements.*—Wing of 9 birds 230–252 mm., culmen 31–38 mm.

*Distribution.*—Scandinavia south of lat. 63½ North. Believed to be resident. Is said to be the breeding bird in Lithuania (Sachtleben).

### **Corvus monedula spermologus.**

*Corvus spermologus* Vieillot, *Nouv. Dict. d'Hist. Nat.* viii, p. 40, 1817. Southern France.

*Monedula turrium* Brehm, 1831. Central Germany.

*Monedula arvoreae* Brehm, 1831. Renthendorf, Germany.

*Monedula vulgaris alticeps, planiceps, crassirostris, occidentalis*, Brehm 1866. Nomina nuda.

For details of above see Hartert, *Vög. Pal.* i, p. 16.

*Monedula septentrionalis*, Brehm, *Handb. Naturg. Vög. Deutschl.*, p. 173, 1831. Elsinore (Helsingör), Denmark.

*Adults.*—Very near the typical race, but under-parts darker, which is distinct only in a series. The grey on the neck is usually also darker. Immature birds and soft parts as in *Corvus m. monedula*.

*Measurements.*—Wings of 54 birds vary from 224 in females to 248 in males. Culmen 31–38 mm.

*Distribution.*—Generally western Europe from Denmark and East Prussia, the United Kingdom and south to Gibraltar and Italy. Eastern limits as yet undefined. Formerly a common resident in Malta, now scarce.

*Migration.*—Usually moves with rooks, but sometimes in large flocks of its own species. Appears to be a regular migrant from the northern parts of its range, moving from the end of September to early November. Passage to or from Ireland has not been recorded. Has straggled to the Canary Islands, Algeria, and is a scarce winter visitor to Corsica.

### **Corvus monedula soemmeringii.**

*Corvus soemmeringii* Fischer, *Mém. Soc. Imp. Nat. Moscou*, i, p. 3, 1811. Moscow.

*Corvus collaris* Drummond, *Ann. & Mag. Nat. Hist.* xviii, p. 11, 1846. Macedonia.

*Corvus ultracollaris* Kleinschmidt, *Falco*, xiv, p. 16. Naryn in Turkestan. Wing of type 255 mm., an abnormal giant.

*Adults.*—Paler under-parts than *C. m. spermologus* and nearer *C. m. monedula*, but differs from the latter in having a more distinct, larger and whiter neck and spot at sides of neck. The race is very variable and individuals occur in

western Europe and Scandinavia which cannot be distinguished from this race. Similarly from the same breeding colony of *C. m. collaris*, both in Kashmir and Palestine, examples cannot be distinguished from Swedish or British examples.

Soft parts as in other races.

*Distribution.*—Finland, the whole of Russia, Macedonia, and the Balkan Peninsula south to Greece, Cyprus, Asia Minor, the Caucasus, Kurdistan, Palestine, Persia, Turkestan, and Kashmir.<sup>1</sup> East in Siberia to the Yenesev Valley. Perhaps breeds on the Suez Canal near Suez (Nicoll MSS.).

*Migration.*—Occurs in winter in East Prussia. Large flocks visit Palestine and Iraq in winter. Also a winter visitor to southern Afghanistan, northern Baluchistan, and the Punjab.

*Table of Measurements of Corvus m. soemmeringii.*

Number.	Locality.	Wing.	Culmen.
3	Finland . . . . .	235-246	32
1	Moscow . . . . .	246	32
1	Petchora R. . . . .	245	33
9	Central Russia . . . . .	233-244	32-33
1	Irtysch . . . . .	244	33
7	Macedonia . . . . .	223-242	31-35
8	Constantinople . . . . .	224-239	31-36
2	Armenia . . . . .	227-241	30-34
4	Cyprus . . . . .	229-240	31-35
3	Palestine . . . . .	228-234	31-33
5	Iraq . . . . .	225-242	32-35
6	Southern Afghanistan . . . . .	229-239	32-33
3	Samarkhand . . . . .	219-241	29-34
6	Yarkand and Kashgar . . . . .	222-230	30-33
3	Gilgit . . . . .	233-243	31
1	Western Tibet . . . . .	226	32
57	Cashmir . . . . .	223-252	31-37
8	Migrants to N.W. India . . . . .	228-236	30-33
1	Ladak . . . . .	230	32

### *Corvus monedula cirtensis.*

*Coloeus monedula cirtensis* Rothscl. & Hartert, *Nov. Zool.* 1912, p. 471. Northern Algeria.

*Adults.*—They differ from *C. m. spermologus* in having a paler pure slate under-surface. The hind-neck is duller grey and the crown not quite so purplish. As birds become worn the primaries become brown, which has the effect of a golden-brown tinge to the wings when birds are in flight in the sun. Soft parts as in other races.

*Measurements.*—Wings of 23 birds 225-244 mm.

*Distribution.*—Confined to northern Algeria.

### *Corvus dauuricus dauuricus.*<sup>2</sup>

*Corvus dauuricus*, Pall., *Reise Russ. R.*, iii, *Anhang.*, p. 694, 1776. Lake Baikal Region.

*Corvus fuscicollis*, Vieillot, *Tabl. Enc. et Meth. Orn.*, ii, 1823. Baikal.

*Corvus capitalis* Wagler, *Syst. Av.* "*Corvus*," sp. 19, 1827 (ex Pallas).

*Corvus neglectus* Schlegel, *Bijdr. Dierk. Amsterdam*, p. 16, 1859. Japan. Based on *Corvus dauuricus* *juv. Faun. Jap.*, pl. 40.

68 examined.

*Adults.*—Crown black glossed with purplish, mantle glossy blue-black, wing-coverts with a purple gloss. Tail black with blue and green sheen. Sides

<sup>1</sup> Is a permanent resident in prodigious numbers in the Vale of Kashmir, hundreds of thousands roosting in winter in the poplar-trees near Srinagar. A straggler to Ladak.

<sup>2</sup> Since writing the above I am inclined to consider *C. dauuricus* a race of *C. monedula*.

of face and ear-coverts greyish white. Chin and throat black. Rest of underparts and a broad collar white or brownish white. Base of feathers grey.

Kleinschmidt and Weigold (*Falco*, 1921, xvii, p. 2) and Kleinschmidt (*Abh. u. Ber. Mus. Dresd.*, xv, 1922, No. 3) consider the dark form of this species (*neglectus*) to be the second normal plumage. Nestlings apparently resemble adults, being white below but moult into their first plumage by assuming the dark phase (*neglectus*). An examination of the specimens in the British Museum neither proves nor disproves this assertion, as there are no certain birds in nestling plumage nor in moult.

La Touche (*Ibis*, 1923, p. 308) found both the pied and black forms breeding in the same colony in Yunnan, and obtained young of both forms. The young of the black form has a dirty grey hind neck which is moulting into black, whilst the young of the pied form is yellowish white which changes after the first moult into white with a grey tinge. This does not confirm Kleinschmidt's contention.

The dark phase has no white collar which is replaced by deep grey, the underparts being ashy or dirty grey or brownish, showing much variation.

*Soft Parts.*—Iris greyish brown, bill and feet black.

*Measurements.*—Wings of 68 vary from 220 in females to 243 in males. Culmen 29–35 mm. All birds measured are from Manchuria, Mongolia, Corea, Japan, and western China. La Touche (*Ibis*, 1923, p. 308) gives the wings of 13 S.E. Yunnan birds as from 216 in females to 241 in males.

*Distribution.*—

*Summer quarters.*—Breeds from Irkutsk on Lake Baikal to the junction of the Ussuri and Amur Rivers and thence to the Sea of Japan, but not reaching to the mouth of the Amur or Sea of Okhotsk. Breeds commonly in Manchuria, but not so far south as Corea or Peking. Colonies occur in the south-east Altai and throughout Mongolia, Kansu, Szechwan, and eastern Yunnan.

*Migration.*—Most birds move south in winter, but some remain in or near their breeding haunts. They have been noted in winter at Urga and at Saissansk on the Upper Irtysh, the latter locality being the most westerly point from which the species has been recorded. In Yunnan birds do not appear to leave their breeding stations except to wander locally.

Summer visitors to Manchuria leave in September and arrive in southern China in October and November, passing through Corea in large numbers, and on autumn passage they are abundant at Peking.

In winter they are common as far south as the Yangtse and have straggled to Formosa. A rare winter visitor to Japan, mainly in the south.

On spring passage birds appear to move north in late February, passage continuing throughout March, and occasionally extending to early and even the third week in May. In North China and Manchuria birds arrive at their breeding stations in early March.

After the severe winter of 1856, the first spring migrant to arrive in Trans-Baikal was a bird of this species on 6.iii.

### ***Corvus dauuricus khamensis.***

*Coloeus dauuricus major* Bianchi, *Ann. Mus. St. Petersburg*, viii, p. 11, 1903. Nomen nudum.

*Coloeus dauuricus khamensis* Bianchi, *Bull. B.O.C.*, xvi, p. 68, 1906. Kham in S.E. Tibet.

1 examined, an adult female, dark phase, collected by Bailey 150 miles N.E. of Sadiya (Assam) on 25.vi.1911, and now in the British Museum.

*Adults*.—Said to be larger only than the typical form. Wings vary from 248–251. Weigold, who collected 10 specimens, gives wings as from 230–249. It seems likely that the form may prove to be sound, but it requires confirmation.

Bailey's specimen, mentioned above, should belong to this form, but has a wing of 236 mm.

*Distribution*.—South-east Tibet.

### Corvus coronoides.

Stresemann (*Verh. d. Orn. Ges. Bayern*, May 1916) reviewed this group, and with slight modification I am inclined to agree with the placing of all these crows under one group, the oldest name for which is *Corvus coronoides*. From the huge *Corvus c. japonensis* to the smaller races from Ceylon and Australia there is perfect intergradation in both colour, size and shape of bill, whilst they all agree in such essential characters as nasal bristles, wing formula and general structure.

The great interest in the *coronoides*-group is the fact that the surface colour of the plumage, the tint of white or grey at the base of the plumage and the colour of the iris, varying as it does from dark brown to white, do not constitute specific characters, the most perfect intergradation existing within the group. None of these characters appear to be stimulated by environment.

The distribution of the group is also instructive. Borneo and Celebes contain no representative. Otherwise, with the exception of a few small islands, the group extends through south-eastern Asia from the mouth of the Amur to Turkestan, south to Ceylon and Tasmania and east to New Britain. In the Malay Peninsula, Java, Sumatra, and the Philippines, the group lives alongside members of the smaller *enca*-group. A study of the group and its distribution throws little light on the lines of dispersion or origin, except that it is probable that dispersion has taken place from the East Indian Archipelago or Australia, assuming a northerly and north-westerly direction. Thus only can the avoidance of Borneo and Celebes be accounted for. The group is tree and jungle-loving, and the deserts of Rajputana, Sind, Afghanistan, Central Asia, and the Gobi Desert appear to have offered an effective barrier to further dispersion.

Whilst agreeing with Stresemann in uniting all these crows within one group, I am unable to recognise certain of his races, namely "hassi," "mandshuricus," "perplexus" and "ceciliae," whilst the name "madarasz" must be replaced by an older name of Madarasz—"anthracina."

The group is not difficult except for its Australian representatives, which have received the most confusing treatment at the hands of Australian Ornithologists.

Gmelin was probably (*Syst. Nat.*, i, p. 365, 1788) the first to name the Australian bird—*Corvus australis*—but the description and locality are so vague as to defy identification and the name has been rightly rejected by recent authors. Then in 1826 Vigors and Horsfield described a crow from near Sydney as *Corvus coronoides*. The type is in the British Museum and has the grey bases to the nape feathers. Then in 1901 North described a crow from Moolah in western New South Wales as *Corvus bennetti*, the main distinctions being the smaller size, white bases to the feathers and less lanceolated throat feathers. So far, so good. That gave us a large bird with grey feather bases and strongly lanceolated throat feathers and a smaller bird with white feather bases and a less lanceolated throat.

The former inhabited roughly a line south of the Dawson River to Central South Australia and thence to about Perth, the latter living north of that area.

In April 1911 Mathews turned his attention to Australian Crows, confusing the issue and creating nomenclatural havoc. In a brief note in the *Fnu* of 1911, p. 326, Mathews replaces the preoccupied name "*australis*" by "*mariannae*," using as a type a bird from Gosford near Sydney. In January 1912 the crows of Australia received a stimulating upheaval at the hands of Mathews. He apparently decided that there were three species of crows in Australia, one of which he calls a raven, the other two remaining crows. The so-called raven became "*mariannae*" and the two crows received the names "*coronoides*" and "*bennetti*." The raven was divided into four races and the crows each into three races. Thus Mathews gave us ten forms of *Corvus* in Australia. The list of types of Australian *Corvidae* should now be consulted in Appendix C.

With the fever of new races upon him, only three months later, Mathews describes yet another form from Western Australia under the name *Corvus ceciliae marngli*, thus creating a fourth species and the eleventh subspecies of Crow in Australia.

But all this was altered in 1913 when Mathews in his *List of the Birds of Australia*, p. 313, used the name "*coronoides*" for the so-called ravens, and divided them into three races, namely, *Corvus c. coronoides* from New South Wales, *Corvus c. perplexus* from Victoria, South Australia, and South-West Australia, and *Corvus c. tasmanicus* from Tasmania. He still recognises two species of so-called crows, the smaller being divided up into *Corvus bennetti bennetti* from the interior of New South Wales and South Australia, and *Corvus bennetti bonhoti* from Northern Territory and interior of Western Australia. The larger crow he retains in three races, namely *Corvus ceciliae ceciliae* from N.W. Australia and Northern Territory, *Corvus c. marngli* from Western Australia, and *Corvus c. queenslandicus* from Queensland and northern New South Wales. It is obvious that during 1912 and 1913 Mathews' mind was not crystallised on the subject of crows, but when in 1920 Mathews describes yet another race as *Corvus ceciliae hartogi* from Western Australia because many of the feathers are brown and not black, one is compelled to treat the author with but scant seriousness. I have not examined the type of this last race, but it probably is a young or very worn adult in full moult, hence the parti-coloured plumage.

Stresemann rightly ignored most of Mathews' races, recognising but one species of crow in Australia which he divides into four races—*Corvus coronoides coronoides*, *perplexus*, *bennetti*, and *ceciliae*, whilst admitting that the Tasmanian bird may be distinct. He also admits that a field study of Australian Crows might induce him to revise his conclusions.

So here we have great diversity of expert opinion, Mathews with his 3 species and 8 subspecies, and Stresemann with his 4 subspecies, all forms of a single species.

Having examined over 220 crows from Australia it is clear that birds from any one locality show great individual variation, a common phenomenon not only among the crows of the world but among many other birds. But in only one case does a bird with grey feather bases occur where the predominant type have white feather bases. This is a bird shot at Normanton in Queensland which is of the type called "ravens" by Mathews, the predominant type being birds

with smaller wing measurement and white feather bases. This is the only really puzzling specimen of the whole series examined. But it would be unreasonable to allow one bird out of over 220 to influence a general deduction based on such a large series.

Mathews based his contention that there are both "ravens" and "crows" in Australia on an assertion that those who know them well in the field can recognise the two birds by their call, and seldom make an error when shooting them. I am unable to accept this statement on the evidence of specimens. In the Mathews' Collection collectors have sometimes differentiated between "crows" and "ravens" on the labels, asserting in some cases that the note is different. In all such cases the "ravens" have been fully adult birds, whilst the "crows" have been immature or not fully adult birds. We all know that young rooks and young ravens have calls distinctive from adults. Further comment appears to be unnecessary. Moreover, I am told by Mathews that he himself is unable to distinguish between the call of a "raven" and "crow." So it seems that the distinction is not very apparent.

The original error on which all Mathews' work in this respect is based was failure to recognise that the colour of the base of the feathers is a sub-specific guide and not a specific character. I know of no species of crow which covers a large area, where the bases of the feathers do not show variation, in some cases slight, in others considerable. The second error into which Mathews fell was failure to recognise that there is great individual variation in size among crows from the same area. The third error was that he did not realise that in adults the throat feathers are more lanceolated and elongated than in birds not so adult. And the final error was the faulty application of misleading field work to scientific ornithology. Of the perpetuation of such errors by the inflation of an already congested synonymy, I have nothing to say.

In examining the series of skins at Tring and in the British Museum, nearly all the birds with dark feather bases have well-developed throat hackles, whilst birds with white feather bases have poorly developed throat hackles. Moreover, except for the one Normanton specimen mentioned above the distribution of birds with snow-white feather bases is very marked as against the distribution of others with feather bases varying from greyish white to dark grey. Somewhere about Gawler Ranges the two forms meet and both occur. Also among the larger birds without snow-white feather bases, occur every gradation of colour of the feather bases from greyish-white to dark grey, and every gradation of throat hackles from huge pointed elongated feathers to rounded short feathers.

On colour of feather bases I therefore divide the Australian Crows into two forms, those with snow-white bases living in an area north of a line from just north of Perth in the west, thence to about Gawler Ranges and east to the extreme northern coast of New South Wales, and birds without snow-white feather bases living south of that line and in Tasmania.

Stresemann appears to have come to an identical conclusion, but further divides the birds with white feather bases into a smaller eastern race (*C. c. bennetti*) and a larger western race (*C. c. ceciliae*), and he divides the birds with grey or greyish-white feather bases into a smaller western race (*C. c. perplexus*) and a larger eastern race (*C. c. coronoides*). Let us see if this can be justified. For detailed measurements see Appendix D.



MEASUREMENT OF BIRDS WITH SNOW-WHITE FEATHER BASES.

Specimens.	Locality.	Wing. mm.	Culmen :	
			Length. mm.	Height. mm.
64	Queensland and the extreme north of New South Wales	288-354	46-61	19-26
11	Northern Territory . . . . .	285-357	47-62	18-27
11	North-Western Australia. . . . .	296-361	47-62	19-26
9	Northern Western Australia . . . . .	298-345	47-63	19-25

It is true that an average measurement gives one a considerable difference, but on the above measurements, I doubt whether separation can be justified in a genus which shows such remarkable individual diversity in size throughout the world.

MEASUREMENT OF BIRDS WITHOUT SNOW-WHITE FEATHER BASES.

Specimens.	Locality.	Wing. mm.	Culmen :	
			Length. mm.	Height. mm.
39	New South Wales. . . . .	302-379	49-62	20-26
45	Victoria . . . . .	305-360	47-60	20-25
7	Tasmania . . . . .	336-357	60-67	23-25
15	Southern South Australia . . . . .	295-351	49-60	19-25
10	South-Western Australia . . . . .	298-347	46-56	20-23

The smallness of western birds is here more marked, but with an overlap of 45 mm. separation cannot be justified.

I am therefore unable to admit that there are more than two races of Australian crows, a northern form with snow-white feather bases and a southern form with grey or whitish-grey feather bases.

**Corvus coronoides japonensis.**

*Corvus japonensis* Bouaparte, *Consp. Av.* i, p. 386, 1850. Japan. Type locality designated by Stresemann as Yesso.

*Corvus macrorhynchus mandschuricus* Buturlin, *Mess. Orn.* iv, No. 1, p. 40. March 1913. Ussuriland.

30 examined from Japan and 11 from N.E. Asia.

*Adults.*—The largest of the group approaching in size the smaller forms of *Corvus corax*. Forehead, crown, and nape dull black with a slight oil-green tinge and inclined to steel-blue on the forehead. Remainder of upper parts violet purple paler on the wings. Primary coverts inclined to greenish. Throat feathers purplish steel-blue with a suggestion of green. Remainder of under-parts dull steel-blue with a purplish tinge. Base of nape feathers dark grey. Throat feathers distinctly lanceolated.

*Soft Parts.*—Iris dark brown, bill and feet black.

*Measurements.*—Birds from Japan have wings 325-388, length of culmen 67-79, and height 28-34. Birds from Corea, Ussuri, and Amurland have wings 337-364, culmen length 60-75, height 26-31. The supposed differences between this race and *mandschuricus* is only apparent in the size of the culmen. Some Japanese birds run very large, but by far the majority are similar to Manchurian specimens. Doubtless in a large series the Japanese birds will average larger, but I do not consider the differences warrant separation.

*Distribution.*—Japan. Birds seen from Yesso, Hondo, Kiushiu, Tanega, Yakushima, Hakodate, Southern Kurile Islands and Saghalien. Mainland specimens examined from Corea, Amur Bay, Amur- and Ussuriland. Also Tsushima (?).

*Birds from Bonin Island.*—There are two birds from Bonin Island in the British Museum which are slightly less purplish (more violet) on the upper-parts, and with a more deeply curved culmen. These probably constitute a new form.

### **Corvus coronoides colonorum.**

*Corvus sinensis* Moore ex Gould MSS. (nec Gmelin, 1788), *Cat. Birds East Ind. Coy.* ii, p. 556, 1858. Shanghai. Type examined. Specimen in full moult and labelled Pootoo (near Shanghai). ♂ 12.viii.1850. Wing 337, culmen 67 mm.

*Corvus colonorum* Swinhoe, *Ibis*, 1864, p. 427, Sawo Harbour, north-east Formosa.

*Corvus hassi* Reichenow, *Orn. Monatsb.*, 1907, p. 51. Tsingtau.

18 examined from northern China and southern Manchuria.

21 examined from southern China and Formosa.

*Adults.*—Similar in colour of plumage to *japonensis* with a slightly more blue mantle, not so purplish. Under-parts not so dark as in either *andamanensis* or *levaillantii*. Base of nape feathers dark grey, and darker than in any of the Indian or Melanesian forms.

*Soft Parts.*—Iris dark brown. Legs, feet and bill black.

*Measurements.*

Specimens.	Locality.	Wing. mm.	Culmen.	
			Length. mm.	Height. mm.
18	N. China and S. Manchuria	299-350	52-63	20-26
12	Mainland S. China	310-350	57-68	24-29
9	Formosa	320-350	52-62	23-25

*Distribution.*—Birds examined from Peking, southern Manchuria, Chiukiang (Kiangsu), Foochow, Fohkien, Lower Yangtse, Yangtse Big Bend, Shanghai, Swatow, and Formosa.

### **Corvus coronoides connectens.**

*Corvus coronoides connectens* Stresemann, *Verh. Orn. Ges. Bayern*, xii, p. 281, 1916. Miyakoshima, Riu Kin Islands. Type in the Tring Museum.

15 examined, including the type.

*Adults.*—An unsatisfactory race. Plumage similar to *japonensis* and *colonorum*, but culmen usually longer and slenderer, though of similar height. Wing averaging smaller. Base of nape feathers dark grey.

*Soft Parts.*—Iris dark brown, bill and feet black.

*Measurements.*—Wing 310. 318-337. Culmen length 55-68, height 21-24.

*Distribution.*—Birds examined from Miyakoshima and Okinawa in the Riu Kin Islands.

### **Corvus coronoides osai.**

*Corvus macrorhynchus osai* Ogawa, *Annot. Zool. Japon.* v, pt. 4, p. 196, 1905. Kohamashima, in the southernmost Riu Kin Islands. Type at Tring.

12 examined, including the type.

*Adults.*—Merely a dwarf form of *colonorum*, which it resembles in every respect except size.

*Measurements.*—Wing 270-295, culmen length 51-55, height 19-21 mm.

*Distribution.*—The most southerly Riu Kiu Islands or Yayeyama Group, namely Ishigaki, Kuro, Kohama, and Aragusuku.

**Corvus coronoides intermedius.**

*Corvus intermedius* Adams, *P.Z.S.*, 1859, p. 121, Kashmir, Dagshai, and Simla. Kashmir apud Stresemann.

*Corvus coronoides tibetosinensis* Kleinschm. & Weigold, *Abh. und Ber. Zool. Mus. Dresd.* xv, 1922, No. 3, p. 2. S.E. Tibet and Sifan Region, in the subalpine forests. Based on two specimens. ♂ wing 375, ♀ wing 348 mm. A race of *Corvus* based on the size of two specimens only can scarcely be accepted without further confirmation. Possibly synonymous with *C. c. japonensis*.

Over 50 examined.

*Adults*.—Similar in plumage to *japonensis*, but with paler grey or even whitish bases to the nape feathers, which are, however never snow-white. Birds from the central and eastern Himalayas tend to have whiter bases to the nape feathers than others from Gilgit and Kashmir. Smaller than *japonensis*. Throat feathers lanceolated, though not so much as in *japonensis* or *colonorum*.

*Soft Parts*.—Iris dark brown. Bill and feet black.

*Measurements*.—Wing 301–365, usually between 318 and 345. Culmen length 54–62, height 23–25 mm.

*Distribution*.—Chinese Turkestan (rare), Gilgit, Baltistan, south to Kashmir<sup>1</sup> and Attock on the Indus, thence east along the Himalayas through Simla (common), Nepal and Sikkim. Eastern Tibet, ascending to over 12,000 feet.

**Corvus coronoides levaillantii.**

*Corvus levaillantii* Lesson, *Traite d'Orn.*, p. 328, circa 1831. Bengal.

*Corvus culminatus* Sykes, *P.Z.S.*, 1832, p. 98. Deccan. A very small specimen which I cannot accept as pre-occupying *madarasi*, as all other birds from the Deccan are of the type *levaillantii*, *culminatus* being an aberrant specimen and not typical. Similar dwarf examples occur at Simla, Etawah, Ahmednuggar, etc., but are exceptional.

Over 50 examined.

*Adults*.—Upper-parts as in *intermedius*, but the under-parts an intenser and blacker blue. Base of nape feathers never so pale as in *intermedius*, but rarely so dark as in *japonensis* or *colonorum*. Bases usually darker than in *andamanensis*.

*Soft Parts*.—Iris dark brown, bill and feet black.

*Measurements*.—Wing 280–315, culmen length 55–62, height 21–25 mm.

*Distribution*.—The whole of India east of the Sutlej Valley, east to Bengal, north to the base of the Himalayas, Rajputana (central and eastern), and south at least to Madras and the Nilgiri Hills. The border-line between this race and *madarasi* is indefinite, the two races interlapping over a wide area.

**Corvus coronoides andamanensis.**

*Corvus andamanensis* Beavan ex Tytler MS., *Ibis*, 1866, p. 420. Andamans. Nomen nudum. Idem, *Ibis*, 1867, p. 328. Andamans, first description.

*Corvus coronoides mengtszensis* La Touche, *Bull. B.O.C.* xliii, 1922, p. 80. Mengtsz. A name given to the intermediate form where *C. c. andamanensis* and *colonorum* meet.

47 examined.

*Adults*.—Upper-parts as in *intermedius*, *levaillantii*, and *colonorum*. Under-parts dark and intense as in *levaillantii*. Bases of nape feathers medium grey, never so dark as in *colonorum* and never so pale as in *intermedius*, but usually paler than in *levaillantii*. This character is very variable in this race and many

<sup>1</sup> Apparently absent from Ladak.

specimens are indistinguishable from *levaillantii*. Throat feathers poorly lanceolated.

*Soft Parts*.—Iris dark brown, legs, feet, and bill black.

*Immature*.—No throat lanceolation and with dark grey bases to feathers of nape.

*Measurements and Distribution.*

Specimens.	Locality.	Wing. mm.	Culmen.		Bases of nape feathers.
			Length. mm.	Height. mm.	
24	Andamans	294-310	51-60	24	Whitish grey.
1	Assam	335	63	27	Medium grey.
2	Naga Hills	300, 309	61	26	1 whitish, 1 medium grey.
1	Mt. Victoria	312	61	24	Almost white.
1	Manipur	330	62	28	Whitish grey.
2	Lower Pegu	300, 330	61, 67	24	Dark grey and closely resembling <i>colonorum</i> .
1	Moulmein.	329	64	23	Whitish grey.
7	Malay Peninsula	300-335	60-69	23-26	Whitish grey.
3	Annam	282-336	55-64	23-26	Whitish grey.
1	Bangkok	330	65	27	Whitish grey.

Two birds from Yunnan are intermediate between this race and *colonorum* in every respect. In the Malay Peninsula this race seems to extend south to lat. 11° South, where *macrorhynchus* commences.

Robinson and Kloss (*Journ. Nat. Hist. Soc. Siam*, vi, 1923) consider the Bangkok Crow to be intermediate between *andamanensis* and *macrorhynchus*.

### **Corvus coronoides anthracinus.**

*Corone anthracina* Madarasz, *Ann. Mus. Nat. Hungar.* 8, 1911, p. 420. Ceylon.

*Corvus coronoides madaraszii* Stresemann, *Verh. Orn. Ges. Bayern.*, xii, p. 285, 1916. Colombo, Ceylon. Type examined.

8 examined from Ceylon and others from S. India (see below).

*Adults*.—Resembles *levaillantii*, but the lower parts are even more intense and with a distinct violet tinge. Bases of nape feathers dirty white or pale grey. Haekles poorly lanceolated. Smaller.

*Measurements*.—Wing 283-304, culmen length 52-58, height 20-25 mm.

*Distribution*.—Ceylon and extreme Southern India. A bird from the Wynaad is intermediate with *levaillantii* with wing 274, culmen length 56 and height 22. Three birds from Belgaum and near Belgaum approach this race with wings 275-285, culmen length 51-54, height 21-22, but in colour they more nearly approach *levaillantii*. Similar birds occur rarely in the Nilgiris and are probably wanderers from the surrounding plains.

### ? **Corvus coronoides hainanus.**

*Corvus coronoides hainanus* Stresemann, *Verh. Orn. Ges. Bayern.*, xii, p. 286, 1916. Hoihow, Hainan.

17 examined, including the type.

*Adults*.—Of doubtful distinction from *colonorum*. Bases of nape feathers dark grey as in *colonorum*. Perhaps a larger bird.

*Measurements*.—Wing 327-365, culmen length 58-72, height 22-29.

*Distribution*.—Confined to Hainan.

**Corvus coronoides macrorhynchus.**

*Corvus macrorhynchus* Wagler ex Temm. *MS. Syst. Av. Corvus* sp. 3, 1827. Java. Type in the Munich Museum.

*Cornix timorensis* Bonaparte, *Compt. Rend.*, 37, p. 829, 1853. Timor.

19 examined.

*Adults.*—Very near *andamanensis*, but with slightly more violet on the upper parts and with the bases of the nape feathers whiter, occasionally snow-white. Birds from Sumatra have the bases as a rule whiter than others from Java, Timor, etc.

*Soft Parts.*—Iris brown, bill, feet and legs black.

*Measurements.*—Wing 322–364, culmen length 62–71, height 23–27 mm.

*Distribution.*—From south of lat. 11 in the Malay Peninsula, throughout Sumatra (very rare), Java, Flores, Lombok, Timor, Bali, Sumba. One obtained Labuan (Stresemann).

*Birds from Wetter Island.*—Two birds from Wetter Island have wings 322 and culmens measuring 65 long and 24 high. The bases of the nape feathers are almost snow-white. The mantle is markedly less violet and more blue than either *macrorhynchus* or *philippinus*. Possibly an undescribed race.

**Corvus coronoides orru.**

*Corvus orru* Bonaparte, ex *Mueller MS. Consp.* i, p. 385, 1850. Lobo Bay, New Guinea.

*Corvus annectens* Brueggemann, *Abh. Ver. Bremen* v, p. 76, 1876. No locality. Type in Darmstadt Museum, wing 326 mm. Obtained at Goroutalo (Schneider), in Celebes (Sharpe, *Cat. B.M.* iii, p. 43). But does this race really occur in Celebes?

*Corvus salvadorii* Finsch, *Mitt. Orn. Vereins*, Wien, July 1884, p. 109. Port Moresby. Founded on *Corvus* sp. ? of Salvadori, *Annali Mus. Civico Genova*, xvi, p. 198, note. Said to be like *orru* but larger and darker with more steel-blue above, tail and primaries with green metallic sheen. I have seen 2 birds from Port Moresby and they agree with typical *orru*.

41 examined.

*Adults.*—Differs from *macrorhynchus* in having little or no green or bluish-green sheen on the upper parts, this being replaced by violet. The colour of the iris in adults is also never brown, but always blue or whitish-blue or greyish blue. Bases of nape feathers invariably snow-white in adults. Differs from *bennetti* in having an intenser gloss on the upper-parts and in being not so blue underneath.

*Soft Parts.*—Iris of adults blue or whitish blue, and in immature birds brownish grey. Feet and bill black.

*Measurements.*—Wing 293–349, culmen length 55–64, height 20–26 mm.

*Distribution.*—New Guinea. Also Goodenough, Waigiou, Salwattee, Ternate, Misol, Obi and Morty Islands, and the West Papuan Islands. The record from Celebes is probably an error.

**Corvus coronoides insularis.**

*Corvus insularis* Heinroth, *J. f. O.*, 1903, p. 69. Gazelle Peninsula, New Britain.

11 examined.

*Adults.*—Similar to *orru*, but smaller.

*Soft Parts.*—Iris pale blue or bluish white in adults, and according to Heinroth even in the young bird the iris is pale blue. Legs and bill black.

*Measurements.*—Wing 282–310, culmen length 52–63, height 21–24 mm.

*Distribution.*—New Britain and New Ireland, but I have not examined any specimens from the latter place.

**Corvus coronoides philippinus.**

*Corvus philippinus* Bonaparte *Compt. Rend.* xxxvii, p. 830, 1853. Philippines.

*Corvus solitarius* Kittlitz, *Reise n. d. Russisch. Amerika*, ii, p. 431, 1858. Manila. Nomen nudum.

*Corvus brevipennis* Schlegel, *Bijdr. Dierk. Genus Corvus*, p. 9, 1859. Philippines.

31 examined.

*Adults*.—Smaller than *macrorhynchus* or *orru*. Upper-parts more violet than in *levaillantii* or *colonorum*, but not so violet as in *macrorhynchus*. Bases of nape feathers snow-white or nearly so.

*Soft Parts*.—Iris dark brown. Feet and bill black.

*Measurements*.—Wing 285–333, culmen length 58–69, height 21–25 mm.

*Distribution*.—Birds examined from Manila, Mindanao, Luzon, Negros, Zebu, Leyte, Bohol, Panay, and Sibutu. Apparently inhabits all the Philippine Islands except Palawan. Also the Sulu Archipelago.

**Corvus coronoides latirostris.**

*Corvus latirostris* A. B. Meyer, *Zeitschr. Ges. Orn.*, i, p. 199, 1884. Timorlaut.

9 examined.

*Adults*.—Slightly darker and bluer than *macrorhynchus*, and very near *bennetti* in colour, but the base of the bill is usually somewhat broader than in the latter race. Stresemann's contention that the throat haekles are longer does not hold good in the series I have examined. Bases of nape feathers almost snow-white.

*Soft Parts*.—Iris blue, bluish white, or white. Feet and bill black.

*Measurements*.

Locality.	Wing. mm.	Culmen :	
		Length. mm.	Height. mm.
5 from Tenimber Island . . . . .	305–328	51–59	23–26
4 from Baba Island . . . . .	316–343	56–61	24–27

**Corvus coronoides bennetti.**

*Corvus bennetti* North., *Vict. Nat.*, xvii, p. 170, 1901. Moolah. Western New South Wales.

*Corvus coronoides ceciliae* Mathews, *Nov. Zool.* xviii, p. 442, 1912. Napier Broome Bay, N.W. Australia.

*Corvus bennetti bonhoti* Mathews, *idem*, p. 442. Murchison, Western Australia.

*Corvus bennetti queenslandicus* Mathews, *idem*, p. 443. Dawson River, Southern Queensland.

*Corvus ceciliae marngli* Mathews, *Austr. Avian Record*, i, p. 52, April 1912. Marnagle Creek. West Kimberley, North-West Australia.

*Corvus ceciliae hartogi* Mathews, *Bull. B.O.C.* xl, p. 76, Jan. 1920. Dirk Hartog I., W. Austr.

*Adults*.—Very near *C. c. orru*, but apparently even darker and bluer. Base of nape feathers snow-white. Throat haekles sharp and pointed, but not so fully developed as in *C. c. coronoides*.

*Immature*.—As the adult, but bases of feathers not quite so white.

*Soft Parts*.—Bill and feet black. Iris white, white and blue, or blue.

*Measurements*.

Locality.	Wing. mm.	Culmen :	
		Length. mm.	Height. mm.
Queensland, extreme north of New South Wales and Northern Territory . . . . .	285–357	46–62	18–27
North-Western Australia and Northern Western Australia	296–361	47–63	19–26

For detailed measurements see Appendix D.

*Distribution.*—Generally north of a line running from lat. 30 S. in New South Wales, through Southern Australia near the Gawler Ranges, and thence west to the coast immediately north of Perth.

**Corvus coronoides coronoides.**

? *Corvus australis* Gmelin, *Syst. Nat.* 8, p. 365, 1788, "habitat in insulis maris australis" ex Latham  
Species indeterminable.

*Corvus coronoides* Vigors and Horsfield, *Trans. Linn. Soc.* xv, p. 261, 1826. No locality. Parramatta, New South Wales (Stresemann). Type examined.

*Corvus affinis* Brehm, *Isis*, 1845, p. 357. New South Wales (nec Shaw 1809, and Rueppell 1835).

*Corvus mariannae* Mathews, *Emu* x, p. 326, 1911. Gosford, near Sydney. New name for *Corvus australis* of Gould.

*Corvus coronoides perplexus* Mathews, *Nor. Zool.* xviii, 1912, p. 442. Perth, S.W. Australia.

*Corvus mariannae mellori* Mathews, idem, p. 443, 1912. Angus Plains, South Australia.

*Corvus mariannae halmaturinus* Mathews, idem, p. 443, 1912. Kangaroo Islands, South Australia.

*Corvus mariannae tasmanicus* Mathews, idem, p. 443. Tasmania.

*Adults.*—Outwardly similar to *C. c. bennetti*, but with usually larger and better developed hackles and never with snow-white feather bases on the nape. The former and latter are subject to great individual variation and every gradation can be found from long lanceolated throat feathers to others showing scarcely any sign of lanceolation. The bases of the feathers vary from whitish-grey to dark grey. Birds with the darkest grey feather bases usually have the most developed throat hackles.

*Immature.*—Hackles less developed and feather bases usually darker.

*Juvenile.*—No hackles and with dark feather bases. General plumage soft and brown.

*Soft Parts.*—Bill and feet black, iris white to brownish white.

*Measurements.*

Locality.	Wing. mm.	Culmen:	
		Length. mm.	Height. mm.
Birds from New South Wales, Victoria . . . . .	302-379	47-62	20-26
Tasmania . . . . .	336-357	60-67	23-25
Southern South Australia . . . . .	295-351	49-60	19-25
South-Western Australia . . . . .	298-347	46-56	20-23

For detailed measurements see Appendix D.

*Distribution.*—Generally south of a line running from lat. 30 South in New South Wales, through Southern Australia to a point on the coast of Western Australia just north of Perth. A specimen of this race has occurred at Normanton in North Queensland. Tasmania.

**Corvus mexicanus mexicanus.**

*Corvus mexicanus* Gmelin, *Syst. Nat.* i, 1788, p. 375. Mexico.

33 examined from Northern Mexico.

*Adults.*—Forehead, crown, and nape a deep glossy violet, the rest of the upper-parts bluer violet, blending into purple on the wings. Under-parts a deep glossy greenish indigo blue. Bases of feathers of the nape a medium grey.

*Measurements.*—Wing 236–270, culmen length 36–44, height 15–17 mm. Wing 231–259, culmen 37.5–42 (Ridgway).

*Distribution.*—Birds examined from Sonora, Presidio, Mazatlan, and Tepic in north-western Mexico, and from Nuevo Leon, Tamaulipas, and Tampico in north-eastern Mexico.

### **Corvus mexicanus ossifragus.**

*Corvus ossifragus* Wilson, *Amer. Orn.* v, p. 27, 1812. Great Egg Harbour, New Jersey, U.S.A.

*Corvus muritimus* "Bartram" Coues, *Check List*, 2nd ed., 1882, No. 343. Nomen nudum.

17 examined.

*Adults.*—Similar to *C. m. mexicanus*, but much duller and slightly larger. Nasal bristles better developed. General plumage glossy blue-black, more violet at the forehead, and with sometimes a violet gloss on the crown. Under-parts deep glossy indigo blue with a distinct greenish tinge. This is very apparent if compared to any of the continental races of *Corvus brachyrhynchos*. This form is very near *Corvus brachyrhynchos palmarum* from the West Indies and is sometimes almost impossible to distinguish. The latter is, however, usually smaller and the mandibles are slightly more pinched, giving a slenderer appearance.

*Soft Parts.*—Iris brown, bill and feet black.

*Measurements.*—Wing 265–290, 264–300 (Ridgway). Culmen length 41–46, 39–45 (Ridgway). Culmen height 17–18.

*Distribution.*—Atlantic and Gulf Coast of the United States, including Florida. North to the Lower Hudson Valley and shores of Long Island Sound. Casual to Massachusetts: west along the Gulf Coast to Louisiana. The range extends inland to the Blue Ridge Mountains.

### **Corvus brachyrhynchos.**

This species is tentatively divided into seven forms, two insular and five continental. Of the latter *Corvus b. caurinus* is easily recognisable, but the remainder are not so distinct. They are separated on an average measurement. If localities were erased from the labels it would, in the majority of cases, be quite impossible to determine to which form they belong. But as the material examined has not been very large, the forms have been accepted with a query.

Regarding the insular forms "*minutus*" and "*palmarum*" they have hitherto been regarded as two species. When specimens were first examined from Cuba, Haiti, and San Domingo, not the slightest difference was apparent, but the material being scanty, reference was made to American Museums, this view being confirmed. But it has since been pointed out that in a large series a slight difference does in fact exist; the two forms are therefore retained, but as races of the same species. These insular forms appear to fit in well with the "*brachyrhynchos*" group, and are treated as geographical forms of that species.

The interesting fact about this group is that they do not entirely conform to the usual principle that more northerly forms are larger than those from more southerly regions. "*Caurinus*" from the north-west is the smallest of the continental forms, and yet occurs in higher latitudes and colder climates than the larger forms.



**Corvus brachyrhynchos brachyrhynchos.**

*Corvus brachyrhynchos* Brehm, *Beitr. Vögelk.* ii, 1822, p. 56, "North America." Restricted locality Boston, Mass. (Howell, *Proc. Biol. Soc. Wash.* xxvi, p. 200).

*Corvus americanus* Aud., *Orn. Biogr.* ii, p. 317, 1834. "Common throughout the U.S.A."

*Corvus frugivorus* Coues, *Proc. Ac. Nat. Sci. Philad.* 1875, p. 346. Pennsylvania.

27 examined.

*Adults.*—Upper and lower parts glossed with deep violet blue. Primary coverts with traces of green. Bases of nape feathers medium to dark grey. Feathers of throat short, hairy, and not lanceolated. Nostrils in deep pit, not in a groove. Nasal bristles cover nostrils and basal vertex of culmen. 1st primary about equal to longest secondary, sometimes very slightly longer or shorter.

*Soft Parts.*—Iris dark brown, bill and feet black.

*Measurements.*—Wing 302–335, culmen 48–54 in length and 21–22 in depth. Wing 282–337, culmen 45–53 (Ridgway).

*Distribution.*—Eastern North America. Breeds from south-western Mackenzie, central Keewatin, central, Quebec, and Newfoundland.

Winters from near the northern boundary of the United States southwards.

It would appear that some specimens from Colorado can be referred to this race, or ? *C. b. paulus*.

**? Corvus brachyrhynchos paulus.**

*Corvus b. paulus* Howell, *Proc. Biol. Soc. Wash.* xxvi, p. 199, Oct. 1913. Alabama.

9 examined.

Smaller than the typical form and with a slenderer bill. Nearest to *C. b. hesperis*, but with a shorter wing and slightly larger bill. Wing of four males 285–300. A doubtful race.

*Soft Parts.*—As in *C. b. brachyrhynchos*.

*Distribution.*—South-eastern United States except Florida, north to the District of Columbia and South Illinois, and west to Eastern Texas. ? Bermuda.

**Corvus brachyrhynchos pascuus.**

*Corvus americanus* var. *floridanus* Baird, *Birds N. Amer.* p. 568, 1858. Southern Peninsula of Florida (nec Bonaparte 1828).

*Corvus americanus pascuus* Coues, *Auk*, xvi, 1899, p. 44. Southern Florida.

26 examined.

*Adults.*—Wing shorter than in *C. b. brachyrhynchos*, but bill and feet stouter.<sup>1</sup>

*Soft Parts.*—As in *C. b. brachyrhynchos*.

*Measurements.*—Wing 295–325, culmen length 49–59, depth 22–23. Wing 279–324, culmen 48–55 (Ridgway).

*Distribution.*—Apparently confined to Southern Florida.

**Corvus brachyrhynchos hesperis.**

*Corvus americanus hesperis* Ridgw., *Man. N. Amer. Birds*, p. 362, 1887. Fort Klamath, Oregon.

22 examined.

*Adults.*—Similar to *Corvus b. brachyrhynchos*, but averaging smaller and with a slenderer bill.

<sup>1</sup> Perhaps inseparable from *Corvus b. brachyrhynchos* (cf. Bailey-Wilson, *Bull.* xxxv, No. 3, 1923, pp. 148–9).

*Soft Parts.*—As in *C. b. brachyrhynchos*.

*Measurements.*—Wing 284–325, culmen 43–51 and once 54. Wing 278–325, culmen 43–50 (Ridgway).

*Distribution.*—Western United States generally from Puget Sound, Idaho, and Montana, east to the Rockies and south to northern Mexico, Arizona, and Colorado. In the latter place birds inseparable from the typical form occur.

### **Corvus brachyrhynchos caurinus.**

*Corvus caurinus* Baird, *Rep. Expl. and Surv. R.R. Pac.* ix, 1858, p. 569. Fort Steilacoom, Washington.

11 examined.

*Adults.*—Under-parts dead black or with very slight purplish gloss. Upper-parts glossed with dull purplish or violet. Base of nuchal feathers dull grey. 1st primary about equal to or slightly shorter than the longest secondary. Nasal bristles straight and reaching to about half the culmen, and covering the frontal base. Throat feathers with a slight indication of lanceolation.

*Soft Parts.*—As in *Corvus b. brachyrhynchos*.

*Measurements.*—Wing 268–282 (256–292 of Ridgway), culmen 42–48 in length and 18–19 in depth.

*Distribution.*—Pacific coast of N. America from Kodiak Island and Kukak Bay in Alaska south through British Columbia to Vancouver and Washington State.

### **Corvus brachyrhynchos palmarum.**

*Corvus palmarum* Paul von Württemberg, *Erste Reise N. Amer.*, p. 68, 1835 (footnote). Cibao Mts., San Domingo.

*Corvus solitarius* Württemberg, *Naumannia* ii, 2nd part, p. 55, 1852. Haiti.

18 examined.

*Adults.*—General coloration deep violet blue-black, as in *Corvus ossifragus*, with purplish on the wings. Base of nape feathers dark grey. Throat feathers not elongated or lanceolated. Nasal bristles well developed, covering the nostrils and frontal base of culmen. Under-parts almost identical with *Corvus ossifragus*. Though so near *Corvus ossifragus*, this form and *Corvus b. minutus* are better placed as races of *Corvus brachyrhynchos*, as the bill is slightly more pinched at its tip, thereby agreeing more with that group.

More brilliant in colour than “*minutus*,” the reflections of the upper-parts and wings—especially the latter—being more bluish and purplish and less greenish. The under-parts are more glossy and more purplish, being less of a dead black. But all these differences are very slight and rarely apparent in single specimens.

Ridgway (*Birds N. and Mid. Amer.*, iii, pp. 258 and 276) states that “*palmarum*” is larger, wing 261, culmen 51, bill narrower and less high at base, basal bristles reaching far in advance of the nostrils. Of “*minutus*” he says—smaller, wing 233, culmen 43.5, bill more conical and higher at base. Nasal plumes reaching a little in advance of the nostrils. The first primary is also said to be relatively longer than that of “*minutus*.” I am unable to confirm any of these characters.

*Soft Parts.*—Iris brown, bill and feet black.

*Measurements.*—Through the great kindness of Mr. Outram Bangs, I am able to give the measurements of 31 specimens. Wing 232–260, culmen length 46–53, depth 17–19.

*Distribution.*—Haiti and San Domingo.

**Corvus brachyrhynchos minutus.**

*Corvus minutus* Gundlach, *J. f. O.*, 1856, p. 97. Cienfuegos on the south coast of Cuba.

I examined, and through the kindness of Mr. Outram Bangs the detail of 13 others obtained.

*Adults.*—Identical to *Corvus b. palmarum* in size and proportion. Also similar in plumage, but less glossed, the gloss less purplish, and with the underparts more dead black.

See also under *Corvus b. palmarum*.

*Soft Parts.*—Iris brown, bill and feet black.

*Measurements.*—Wing 233-260, culmen length 44-51, depth 15-19.

*Distribution.*—Cuba and the Isle of Pines. Now very scarce. Both this form and *C. b. palmarum* are forest birds, as are all other West Indian Crows. This form and “*palmarum*” are the only West Indian Crows which “caw”; all others, “*leucognaphalus*, *nasicus*, and *jamaicensis*,” babbling and chattering.

**Corvus capensis capensis.**

*Corvus capensis* Licht., *Verz. Doubl.*, p. 20, 1823. Cape of Good Hope.

*Corvus segetum* Temm., *Pl. col. genus Corvus*, p. 70, 1826. South Africa.

*Corvus macropterus* Wagler, *Syst. Av. sp. Corvus*, 1827. Cape.

*Adults.*—Whole plumage glossy blue-black with a slight purplish tinge, but never so purple as in *Corvus frugilegus*. In worn plumage the bluish sheen almost disappears, leaving a dark coppery oily appearance. First primary about equal to or slightly shorter than the longest secondary. Base of nape feathers dark grey. Throat and chin feathers of adults lanceolate. Culmen long and even slenderer than in *C. frugilegus*.

*Immature.*—Dull dark brown above and below. Tail and wings glossy as in adults.

*Measurements.*

Specimens.	Locality.	Wing. mm.	Culmen. mm.
19	South Africa, Zululand . . .	318, 330-365, 380	57-73
3	Angola . . . . .	321, 325, 355	62-65
12	Abyssinia. . . . .	330-378	57-69

*Soft Parts.*—Iris dark brown to almost black. Bill and legs black.

*Distribution.*—South Africa south of Rhodesia and the Congo. Also the highlands of Abyssinia.

**Corvus capensis kordofanensis.**

*Corvus levaillanti* Des Murs in Lefebvre, *Voyage en Abyssinie, Zool.*, p. 104, 1845. Abyssinia (nec Lesson 1831).

*Corvus capensis minor*<sup>1</sup> Schlegel, *Cat. Mus. Pays-Bas, Coraces*, 1867, p. 7, terra incog. (nec *C. corax minor* Brehm. 1860).

*Corvus capensis kordofanensis* Laubmann, *Verh. Orn. Ges. Bayern*, xiv, p. 103, 1919. Nom. nov. for *C. c. minor*.

*Adults.*—Similar in every respect to *C. c. capensis*, but smaller. This is an unsatisfactory race and probably should not be recognised. Birds from low-

<sup>1</sup> Type in Leyden Museum. Wing 290 mm. No locality.

lying tropical districts are, however, on the average smaller than others from South Africa and the highlands of Abyssinia.

*Measurements.*

Specimens.	Locality.	Wing. mm.	Culmen. mm.
2	Rhodesia . . . . .	318, 340	57, 61
3	Kenya Colony . . . . .	310-337	57-61
9	Sudan . . . . .	300-320	57-64
3	Somaliland . . . . .	302-311	59-63

*Distribution.*—I have not been able to examine specimens from the Congo or West Africa, where the bird probably does not exist. Fairly common in the more open country of Rhodesia, Nyasaland, Portuguese East Africa, Tanganyika Territory, Kenya Colony (but not reaching to the coast), Tropical Sudan (but not west of Lado), the shores of the Victoria Nyanza, and British Somaliland.

**Corvus frugilegus frugilegus.**

*Corvus frugilegus* Linn., *Syst. Nat.* ed. x, p. 105, 1758. Sweden.

*Corvus predatorius* Rennie in Montague's *Orn. Dict. Brit. Birds*, 1831. Substitute name.

*Corvus agrorum* Brehm, 1831. North and Central Germany.

*Corvus granorum* Brehm, 1831, on migration in Central Germany.

*Corvus advena* Brehm, 1831. Germany.

*Corvus agricola* Tristram, *P.Z.S.*, 1864, p. 444. Nablus, Palestine.

*Corvus f. major, gregarius, longi-, angusti-, tenui-, crassirostris, planiceps* Brehm, 1866. Nomina nud.

For full detail of above synonymy see Hartert, *Vög. Pal. Fauna*, i, p. 13.

*Corvus frugilegus tschusii* Hartert, *Vög. Pal. Fauna*, i, p. 14, 1910. Gilgit. Type at Tring.

? *Trypanocorax frugilegus ultimus* Sushkiu, List and distr. birds R. Altai and N.W. Mongolia, p. 65 (1925, "Borderland of Russian Altai, Bukhtarma, Tarbagatai").

*Adults.*—Plumage black with violet-purple sheen. Face, lores, and chin bare. Bill slenderer and more elongated than in *Corvus corone*. 3rd primary equals or is slightly shorter than the fourth, whereas in the *corone*-group the 3rd primary equals the 5th or is between the 5th and 6th.

*Immature.*—Plumage a duller black with less sheen. Base of bill, lores, and chin feathered, and nostrils covered with bristles.

*Soft Parts.*—Adults, iris hazel, bill and feet black. Immature: Iris grey-green, bill and feet black.

*Measurements.*—Wing of 100 birds from Europe and Asia, 297 to 332 mm. Culmen 54 to 63 mm. Females run slightly smaller than males. I cannot recognise the differences ascribed to "*tschusi*," having examined 38 Indian and Mesopotamian specimens. The further east one goes the fewer adults have bare faces, probably because adults are later in assuming bare faces in the east than they are in Western Europe. In Palestine and Mesopotamia one often sees large flocks of birds with feathered faces, and in Persia the majority of breeding birds have their faces feathered.

*Distribution.*—Summer quarters. Generally Europe with exception of the Mediterranean Region and northern Scandinavia and Russia. Has straggled to Greenland and possibly to Spitsbergen in summer. Breeds east to the Irtysh River and the Bukhtarma Valley in N.W. Mongolia. Bred formerly in Palestine at Jerusalem and Nablus, but no longer does so. Also breeds in the Orkneys.

*Autumn migration.*—Rooks move in winter from all countries where the ground is habitually frozen, such as Scandinavia, Northern and Eastern Europe,

and Eastern Siberia. The east coast of England is invaded by large flocks from Central Europe from the latter half of September to the middle of November. Large flocks from Northern Europe reach Scotland during October. Autumn emigration has been observed in the Straits of Dover in September, these probably being British-bred birds.

Records of autumn passage in Southern Europe are fragmentary. Birds arrive in Cyprus about 18. xi, they leave their breeding stations in Armenia during the first week in October and arrive in Palestine from early to mid-November. Birds arrive in Iraq from the third week in Oct. till mid-November from a N.E. direction. At Gilgit they arrive during the third week in October, first arrivals being noted on 19. x. In the Punjab they arrive during the third week in October and are abundant by the end of the month. At Quetta they arrive in large flocks about the middle of November.

*Winter Quarters.*—British Islands, Western Europe south of Denmark and south to Spain (rare in western and south-western parts), and Northern Algeria, Sardinia, Corsica, Sicily, Greece, Asia Minor, Palestine, and Egypt. Almost absent in winter from Northern Germany and Prussia, rare in Poland. Southern Russia roughly south of lat. 50. Caucasia, Armenia, Iraq, south to Fao. North-Western Persia, Trans-Caucasia, shores of Caspian, Russian and Chinese Turkestan, Afghanistan, the Punjab, and Beluchistan. Northern Sind. Rare straggler to Malta and the Azores. Large flocks nearly every year wander far out into the West Atlantic, many perishing or eventually returning to land in an exhausted condition.

*Spring Migration.*—Birds commence arriving in Ireland from 18. iii to 22. iii. Birds move east from Eastern England from the second week in February to the third week in April. Northern European birds leave Scotland from the end of March to the first half of May, occurring in the Faroes and arriving in Scandinavia in late March or early April.

In Heligoland passage has been observed from 4. ii to the middle of April. Winter visitors leave Corsica in early March and Cyprus in the middle of March. The flocks which visit the Egyptian Delta in winter have not been observed after the end of March. Spring emigration from Palestine occurs from 5. ii, the last record being on 21. iii. Breeding birds commence arriving in Armenia during the last third of March and in Southern Russia in mid-March. Birds leave Gilgit in the third week in April, Quetta during March, and the latest record for Southern Afghanistan is on 24. iv. Winter visitors leave the Punjab from the second week in February to the end of March, the latest record being on 15. iv.

Birds leave Eastern Turkestan in early April.

Birds leave Iraq from mid-February and continue doing so till the end of April.

Winter visitors leave the south coast of the Caspian in the second half of March.

### **Corvus frugilegus pastinator.**

*Corvus pastinator* Gould, *P.Z.S.*, 1845, p. 1. Chusan, China.

*Adults.*—Differ from *C. f. frugilegus* in always having the lores and chin feathered, shorter bill, tail and wing, and plumage of head and neck not so blue, but blacker. Soft parts as in *C. f. frugilegus*.

*Measurements.*—Wing of 47 birds 294-318, culmen 48-59 mm.

*Distribution*.—Summer Quarters. Generally N.E. Siberia, Manchuria, and China, west to Lake Baikal, Kansu, and the Chuya Plains in N.W. Mongolia. On passage only in Japan and Corea.

*Migration*.—A migrant from north of the Gulf of Pechili and Russia in Asia. No records of autumn migration. In spring they pass to their breeding grounds from the end of February to early April.

*Winter Quarters*.—Japan south of lat. 40. Corea, Southern Manchuria, Province of Chili, west to Szechuan and south to Canton. Formosa. There appear to be no records from south of Formosa. Very few appear to winter north of lat. 40.

Winter visitors arrive near Hongkong as early as 27. vii, and have been seen as late as 2. v.

### **Corvus leucognaphalus.**

*Corvus leucognaphalus* Daud. in *Traité*, ii, p. 231, 1808. Porto Rico. Type in the Paris Museum. *Corvus erythrophthalmus* Bonaparte, *Compt. Rend.* xxxvii, p. 829 (ex Wurt. MSS.), 1853. San Domingo.

(*Corvus*) *dominicensis* Cory, *Auk*, iii, No. 2, 1886, p. 228. San Domingo.

10 examined from Haiti and 6 from Porto Rico.

*Adults*.—General plumage black with dull steel-blue gloss with traces of purplish or violet on the wings and mantle. Throat feathers slightly elongated. Bases of nape feathers in adults pure white and in immature birds dull white. Nasal bristles fall far short of the basal half of the culmen and barely cover the nostrils, though they incline up to cover the frontal base. I am unable to detect the slightest difference between birds from Haiti and Porto Rico.

Ridgway (*B. North and Middle Amer.*, iii, p. 258) says that Haiti birds are smaller with larger feet and that the plumage is more glossy.

*Soft Parts*.—Irides reddish-brown to bright orange-red. Bill and feet black.

*Measurements*.—Wing of 10 from Haiti 283–310, culmens 55–64 in length and 22–23 in depth.

Wings of 6 from Porto Rico 281–309, culmens 58–62 in length and 22–23 in depth.

*Distribution*.—Apparently confined to Porto Rico and Haiti, having become very scarce in the former locality.

It is interesting that Wetmore has recently identified bones from the Island of St. Croix as belonging to this species (*Proc. U.S. Nat. Mus.*, liv, 1918, p. 521).

Also a small extinct Crow named *Corvus pumilis* (Wetmore, *Proc. Biol. Soc. Wash.*, xxxiii, 1920, p. 81, and *Bull. Am. Mus. Nat. Hist.*, xlvi, 1922, pp. 327–328) has been described from Porto Rico, which is intermediate in size between *C. leucognaphalus* and *Corvus brachyrhynchos palmarum*. So in Cuba, Haiti, and Porto Rico we have two forms of Crow, the one large and the other small.

### **Corvus nasicus.**

*Corvus nasicus* Temminck, *Pl. col.* ii, pl. 413, 1838. Cuba. Type in Leyden Museum.

3 examined.

*Adults*.—Entire plumage black glossed with dull violet, more purplish on head and wings: under-parts duller. Bases of nape feathers grey. Rectal and post-ocular regions naked. Nasal bristles inclined upwards, but short and scanty,

the nostrils being exposed. Nostrils in a cavity, and not in a groove. 1st primary slightly shorter than longest secondary.

*Measurements*.—Wings of 10, 262–301, culmen 44–58 mm. (Phillipps).

*Soft Parts*.—Iris brown, bill and feet black.

*Distribution*.—Cuba and Isle of Pines.

### *Corvus jamaicensis*.

*Corvus jamaicensis* Gmelin, *Syst. Nat.* i, p. 367, 1878. Hills of Jamaica.

9 examined.

*Adult*.—General colour of plumage dull glossless lead-black with a faint greenish wash. Crown and wings with a bluish sheen. Bases of nape feathers dark grey. No lanceolation on throat. Nasal bristles incline to be fan-shaped and meet over the base of the ridge of the culmen, barely covering nostrils.

*Soft Parts*.—Iris greyish brown. Bill and feet black.

*Measurements*.—Wing 213–240, culmen length 44–49, height 18–21 mm.

*Distribution*.—Confined to Jamaica.

### *Corvus rhipidurus*.

*Corvus affinis* Rüppell, *Neue Wirb. Fauna Abyssin. Vögel*, p. 20, 1835. Massowah and Shendi (nec *C. affinis*, Shaw 1809).

*Corvus brachyurus* Brehm, *J. f. O.*, 1854, p. 75. Luxor, Egypt. Type at Tring. Nomen nudum (nec *C. brachyurus*, L., 1766).

*Corvus brachyrhynchos* (*errore*) Brehm, *Vogelfang*, p. 414, 1855. Nomen nudum (nec *C. brachyrhynchos* Brehm, 1822).

*Corvus brevicaudatus* Müller, *J. f. O.*, 1855, p. 456. Nomen nudum.

*Corvus rhipidurus* Hartert, *Bull. B.O.C.* xxix, p. 21, 1918. New name for *Corvus affinis*.

*Corvus brachycercus* Hellmayr, *Verh. Orn. Ges. Bayern*, xiv, p. 131, June 1919. New name for *Corvus affinis*.

39 examined.

*Adults*.—In freshly moulted plumage the bird is black with a steel-blue sheen, more purplish on the scapulars and wing. As the plumage wears the plumage assumes an oily-blue or oily-purple or even a copper tinge, especially about the head, nape, chin, and throat.

Nasal bristles well developed, covering the nostrils and shaped like a fan. Bill short and strong. The tail is very short, falling well below the tips of the wings when closed. This gives the bird a curious bat-like appearance in flight.

Base of nape feathers white, base of mantle feathers dark grey.

*Soft Parts*.—Iris dark brown, bill and feet black.

*Measurements*.

Specimens examined.	Locality.	Wing, mm.	Culmen :	
			Length, mm.	Depth, mm.
11	Somaliland . . . . .	361–402	53–59	21–26
8	Sinai to Baringo (Zedl.) . . . . .	340–400	—	—
?	(Hartert, <i>Vög. Pal.</i> , p. 8) . . . . .	340–370	50–60	—
5	Aden Protectorate . . . . .	349–370	51–55	22–24
7	Abyssinia . . . . .	375–402	53–61	23–27
1	Eritrea . . . . .	382	59	25
3	Near Suakim . . . . .	376–388	57	25
1	Kordofan . . . . .	396	58	26
6	Dead Sea Depression . . . . .	340–378	51–55	22–25
1	Upper Egypt . . . . .	350	56	23

*Distribution*.—Local in the Dead Sea Depression, but not further north than Jericho. Abundant at Petra and towards Akaba. The hills of Central Sinai and the hills in the Aden Hinterland. Throughout British Somaliland. Abyssinia, parts of Upper Egypt and the Sudan, the western Red Sea Littoral and east to Lake Baringo and Mount Elgon. Recorded from Kavirondo in error. The Suk and Turkhana country in the Lake Rudolph Basin, and again in the Southern Sahara at Asben, but not south of Agades.

No migration recorded.

Though superficially this form looks very different to the group usually placed under the genus *Corvultur* (*crassirostris* and *albicollis*) there is in reality a marked affinity. In both, the wings project beyond the tail, the fan-shaped nasal bristles are common to both forms, the nasal grooving is similar, and it is not uncommon in *hipidurus* to find traces of white fringes to the feathers on the hind neck and sides of the neck. *Rhipidurus* seems to connect *crassirostris* and *albicollis* with the forms usually placed within the genus *Corvus*. If it had not been for this it might have been necessary to keep *Corvultur* as a separate genus.

### *Corvultur albicollis*.

*Corvus albicollis* Latham, *Ind. Orn.* i, p. 151, 1790. Africa. I cite Capetown as terra typica.

*Corvus cafer* Lichtenstein, *Cat. Rerum Natur. Hamburg.*, p. 9, 1793. "Terra Cafrorum."

*Corvus vulturinus* Shaw, *Gen. Zool.* vii, p. 343, 1809. Africa.

42 examined.

*Adults*.—Whole head deep bronze. A broad white nuchal patch which reaches to the upper back. Rest of upper and under-parts a fairly glossy blue-black. Frequently a few white fringes to the feathers of the upper breast which form an ill-defined and narrow necklace. Bill very strong and heavily curved. Both mandibles are tipped ivory-white. Nasal bristles fan-shaped as in *C. rhipidurus*. Throat strongly lanceolate.

#### *Measurements.*

Specimens.	Locality.	Wing. mm.	Culmen:	
			Length. mm.	Height. mm.
11	South Africa . . . . .	392-420	58-66	31-36
13	Zambesi Basin . . . . .	390-435	60-68	31-36
12	Kenya Colony, Uganda, and Kilimanjaro . . . . .	400-447	59-73	33-37

*Distribution*.—South-West Africa around Windhoek and neighbouring coastline. Cape Colony except the extreme west, Orange River Colony, Natal, Transvaal, Rhodesia, Nyasaland (perhaps Portuguese East Africa), Tanganyika Territory, Kenya Colony, Uganda, and north to the southern border of Abyssinia. Absent from Somaliland, Congo, and Sudan, except in the very extreme south.

Birds examined from:

South Africa: Cape Town, Dielfontein, Knysna, Transvaal, Bloemfontein, and Zululand.

Nyasaland, Rhodesia, and Mashonaland.

Kilimanjaro.

Kenya Colony: Athi River, Mount Kenya, Lamu, Machakos, and Fort Hall.

Uganda: Ruwenzori, Kampala, Toro, and Lake Kivu.

In addition Reichenow (*Vög. Afr.*, ii, p. 640) records birds from Damaraland, Great Namaqualand, Natal, and Tanganyika Territory.



**Corvultur crassirostris.**

*Corvus crassirostris* Rüppell, *N. Wirb. Vög.*, p. 19, pl. viii, 1835-40. Abyssinia.

16 examined.

*Adults.*—Whole head and neck bronze, darker on the ear coverts, forehead, and front part of crown. A large white patch on the hind-crown and nape, frequently extending to a smaller patch on the back of the neck. Rest of upper-parts deep violet-blue, glossed and washed with copper. Under-parts less glossed and more coppery. Throat feathers strongly lanceolated. Bill even stronger than in *C. albicollis*. Nostrils in deep groove. Nasal bristles fan-shaped.

*Measurements.*—Wing 432-475, culmen length 81-91, height 49-47 mm.

*Distribution.*—The hills of southern Abyssinia, becoming rare away from hills but straggling to the neighbouring parts of British Somaliland, and the Sudan having been reported near Roseires (Hartmann, *J. f. O.*, 1854, p. 232) and from Galabat by Heuglin (*Orn. N.O. Afr.*, ii, p. 507).

**Corvus cryptoleucus.**

*Corvus cryptoleucus* Couch, *Proc. Acad. Nat. Sci. Philad.* vii, No. 2, p. 66, 1854. Tamanlipas, Mexico.

9 examined from Mexico, Texas, and Colorado.

*Adults.*—Whole plumage glossy blue-black with a purplish sheen on the upper-parts. Base of nape feathers snow-white. Nasal bristles well-developed and reaching well on to distal half of culmen and covering the proximal half of the vertex. First primary considerably longer than the longest secondaries. Feathers of throat short and not lanceolate. Wing 328.340-375, culmen 54-59 mm.

*Soft Parts.*—Iris dark brown. Bill and feet black.

*Distribution.*—The great Plains of North America from south-eastern Wyoming and Western Nebraska, south to Central Mexico: West through New Mexico and Arizona to the coast (Los Angeles) of southern California (Ridgway).

**Corvus corax.**

This group, inhabiting in various forms nearly the whole of the Northern Hemisphere, is instructive in conforming to two great principles. The first of these is that birds with a wide distribution show great variation, but that when that range is circum-polar the variation is not constant in any single locality. The second is that the group conforms absolutely with the environmental factor which induces variation, namely, birds from the high north or high altitudes are larger heavier-built birds than those from further south or lower altitudes, and also that birds from dry hot regions tend to assume the pale desert coloration.

Variation in the ravens seems to be due solely to environment, and this makes their distribution and classification a matter of great difficulty. Though the extremes are, of course, easy to identify it would be a brave man who attempted to define the demarcation between *Corvus tibetanus*, stretching, as I hope to show, from the Western Himalayas, through Central Asia, to North-East Siberia, Arctic America, and Iceland, and the true *Corvus corax* of Europe. Also the intergradation between *Corvus corax lawrencei* and *Corvus corax ruficollis* is so perfect in Persia and N.W. India that some specimens are impossible to identify

with certainty, whilst in south-eastern Europe and south-western Asia it is impossible to say where "*lawrencei*" begins and *Corvus c. corax* ends.

Crows, more than any other bird with which I am acquainted, show variation in size from the same locality far in excess of what is usual. A difference of 80 mm. or over 3 inches in the length of the wing is by no means rare in birds from the same place, whilst a difference of over 10 mm. or nearly half an inch in the length of the culmen is found among birds from precisely the same locality.

With such differences it is not surprising that authors have unduly separated the species into too many geographical races, sometimes on single specimens, and all too frequently on too small series.

Over 630 ravens from the Northern Hemisphere have been examined and measurements of many others have been obtained from American and Continental Museums and reliable literature. The detail of these birds, obtained from all sources, have produced the following conclusions, which should be confirmed by more material as it becomes available.

### *Corvus corax tibetanus.*

*Corvus corax littoralis* (nec *C. littoralis* Brehm, 1831) Holboell in Kroyer's *Tidskrift*, iv, 1843, p. 390. Greenland, Labrador.

*Corvus lugubris* Agassiz, *Proc. Bost. Soc. Nat. Hist.*, i, p. 188, 1846. Nomen nudum.

*Corvus tibetanus* Hodgson, *Ann. and Mag. Nat. Hist.* (2), iii, p. 203, 1849. Native Sikkim.

*Corvus carniovor* "Bartram" Baird, *Rep. Pacific R.R. Survey*, ix, 1858, p. 560, partim. Coast of New Jersey.

*Corvus corax kamtschaticus* Dybowski, *Bull. Soc. Zool. France*, 1883, pp. 362-3. Kamtschatka.

*Corvus corax behringianus* Dybowski, *op. cit.*, p. 363. Behring Island.

*Corvus grebniuskii* Stejneger, *Proc. Biol. Soc. Wash.*, ii, p. 97, 1884. Commander Islands.

*Corvus corax principalis* Ridgway, *Man. N. Amer. Birds*, 1887, p. 361. St. Michael. Alaska.

*Corvus corax ussuriensis* Tacz., *Faune orn. Sib. Orient.*, i, p. 527, 1891. Russian Manchuria.

*Corvus corax sibiricus* Tacz., *op. cit.*, p. 526, 1891. East Siberia (nec *C. sibiricus* Gm.).

*Corvus corax islandicus* Hantzsch, *Orn. Monatsb.*, p. 130, 1906. Iceland.

*Corvus corax europhilus* Oberh., *Ohio Journ. Sci.* xviii (6), p. 215, 1918. Alabama, Eastern United States. Partim.

*Corvus corax tschuiensis* Sushkin, List and distr. birds Russian Altai and Mongolia, p. 64 (1925, C. & S.E. Altai, N.W. Mongolia).

*Adults.*—Whole plumage black. Crown glossed greenish or purplish, nape greenish black. Back glossed blue or slightly violet, chin glossed green, throat blackish more reddish-violet. Under-parts glossed green or indigo-blue. Tail glossed green or reddish violet. Secondaries and all wing-coverts glossed reddish violet.

Throat feathers much elongated and strongly lanceolated. Nasal bristles well developed and reaching to or beyond the basal half of culmen. Base of nape feathers dark to medium grey.

*Soft Parts.*—Iris dark brown, bill and feet black.

*Measurements.*—Ravens from North-East Asia, Arctic America, and Iceland have been named without reference to birds from the Himalayas. Iceland birds were separated from Greenland birds, on account of their smaller size. Greenland and Alaska birds have been separated as being larger than specimens from the United States. Birds from north-eastern Asia have been separated on very small series and without reference to birds from Central Asia. I can find no trace of any attempt to treat the group as a whole based on a large series. Hartert (*Vög. Pal.*, i, pp. 3-6) had very little material and had not seen either

"*ussurianus*" or "*kamtschaticus*." Hartert now is convinced that he must unite all the East Siberian ravens, but still has not critically compared them with either Arctic American or Tibetan birds.

An examination of the table of measurements given below exemplifies the wide range in size of topotypical "*tibetanus*," "*principalis*," "*islandicus*," "*ussurianus*," and "*behringianus*." Both giant and dwarf examples occur throughout Arctic America, North-East Asia, and Tibet, but the general size of wing and culmen agrees. No doubt if an average was struck in each locality differences would become more apparent, but no average is of any use unless a huge series is examined. On size alone some 90 per cent. of specimens would be indeterminable, and for this reason I am compelled to unite all these ravens under the oldest name "*tibetanus*."

Specimens.	Locality.	Wing. mm.	Culmen :	
			Length. mm.	Depth. mm.
23	Tibet, Himalayas, Pamirs . . . . .	455-493	75-83	27-31
5 <sup>1</sup>	N. Western Himalayas . . . . .	447-477	73-87	—
9	Ladak . . . . .	442-505 <sup>2</sup>	73-87	29-32
1	North Sikkim . . . . .	467 <sup>2</sup>	84	31
1	Trans-Baikal . . . . .	451	69	27
1	Mongolia . . . . .	432	69	27
2	Northern Japan . . . . .	420, 450	69	27
8	North-East Siberia: Manchuria . . . . .	410-451	71-82	26-34
2	Kurile Islands . . . . .	430, 447	79, 82	31, 33
	Kamtschatka (none examined) . . . . .	to 492 (teste Hart.)		
22	Commander Islands . . . . .	405-460	67-89	24-30
18	Alaska . . . . .	418, 431-455	68-90	24-31
4	Brit. Columbia, Vancouver . . . . .	427-449	66-89	24-31
61	Greenland, Ungava, Mackenzie . . . . .	411-484	72-94	27-35
14	Iceland . . . . .	417-445	73-82	28-33

Apart from size, efforts have been made to separate and name examples on the wing formula. Taczanowski's "*ussurianus*" was based on a bird with the 1st primary longer than the 7th. Hartert (*Vög. Pal.*, i, p. 5) mentions a bird from the Kuriles with a similar long 1st primary. Of the 160 specimens examined of this large form, all have the first primary between the 7th and 8th, and the 2nd primary between the 5th and 6th, except in 4 cases as follows :

*Amur Bay*.—1st primary very slightly shorter than 8th.

*Behring Island*.—1st primary between 8th and 9th.

*Kurile Islands*.—1st primary between 8th and 9th.

*Tibet*.—1st primary equals the 8th.

Allowing, therefore, for an occasional aberrant specimen, I am unable to recognise separation on wing formula.

The strength and size of legs and feet have also been called in to help separation. Here again I find that the differences are individual, birds from Tibet exactly matching others from Iceland, Greenland, and Commander Island birds.

The breadth of the 1st primary near its tip is a purely imaginary difference, and is not constant in any area from which I have examined a series of over 10 specimens.

There is no difference in colour in birds from Iceland, Arctic America, North-

<sup>1</sup> Specimens from Lahul and Spiti, measurements supplied by Mr. Whistler.

<sup>2</sup> Measured in the flesh. About 8 mm. must be deducted to synchronise these measurements with those of a dried skin.

East Siberia, and the Himalayas. The under-parts are sometimes greenish and sometimes bluish. The difference appears to have nothing to do with locality. Buturlin (*Mess. Orn.* 1915, p. 107) thought Pamir birds had greener under-parts than Siberian specimens. The only Pamir bird I have seen has blue under-parts.

It is true I have seen no birds from Kamtschatka, but Buturlin, who compared a large series of Siberian birds, found that there was no difference (*Mess. Orn.*, 1915, p. 107).

I am therefore compelled to unite all the larger ravens under the oldest name—*tibetanus*, though I admit that it is unfortunate that the type locality of Iceland birds should be Sikkin. Such a paradox is inevitable.

Having reached this conclusion, the distribution of *Corvus corax tibetanus* still remains largely a matter of opinion. Being founded on size alone the race has a huge overlap with the typical form. Indeed, some specimens from the British Islands could easily have come from Tibet or Greenland. There is no hard and fast line demarcating their distribution.

Quite generally the distribution of *Corvus corax tibetanus* is Iceland, Greenland, Arctic America, Canada, and extreme north of the United States, Alaska, North-Eastern Asia south to northern Japan, Mongolia, and the Himalayas west to the Pamirs.

As far as is known there is only local movement in winter; others annually remain in the breeding quarters well north of the Arctic Circle throughout the winter. Breeds in the Himalayas up to at least 19,000 ft.

Susehkin (*Orn. Monatsb.*, 1915) refers birds from the northern and central Altai to the large race, but says birds from north-western Mongolia are quite different. The one specimen I have examined cannot be separated from Tibetan or Siberian birds. Scarce in Saghalien and northern Japan.<sup>1</sup> Very common in Kamtschatka. The furthest north-breeding locality seems to be in lat. 81° 44' at Cape Lupton (Nares, *Polar Seas*). Apparently absent from the Pribilof Islands. Is nearing extinction in the Northern United States.

Poljakow reports *Corvus corax kamtschaticus* from the Tarbagatai Range on the Upper Irtysh.

### (?) *Corvus corax varius*.

*Corvus varius* Brünn., *Orn. Bor.*, p. 8, 1764. Faroes.

*Corvus leucophaeus* Vieill., *Nouv. Dict. d'Hist. Nat.*, viii, p. 27, 1817. Faroes.

*Corvus leucomelas* Wagler, *Syst. Av. Genus Corvus*, sp. 4, 1827. Faroes.

*Corvus ferroensis* Schlegel, *Bijdr. tot de Dierk. Genus Corvus*, p. 6, 1858. Faroes.

6 examined (3 showing partial albinism).

Precisely similar to *Corvus c. tibetanus*, and with a whitish base to the feathers. Some specimens show partial albinism. I am unable with material available to confirm Hartert's contention that the body plumage is softer and without so much purple gloss.

Wing of 6, 405–434 mm. Hartert (*Vög. Pal. Fauna*, i, p. 4) records one of 440 mm. Culmen 82–87 in length and depth 29–31 mm.

Confined to the Faroe Islands. Albinistic varieties no longer occur.

<sup>1</sup> In the *Journal Coll. Sci. Imp. Univ. Japan*, xxiii, p. 60, Lonnberg includes *Corvus corax* in his list of birds known from Saghalien on the authority of Nikolski, who reported them as scarce. Professor Ijima did not record it. Kuroda (*Handlist of Japanese Birds*, 1922, p. 162) gives the habitat of *C. c. kamtschaticus* as Saghalin, Kurile Islands, and Hokkaido.

It seems very doubtful whether a race which shows an albinistic tendency should be recognised on that character alone. If it is not recognised *Corvus varius* takes precedence of *Corvus tibetanus*, for the Faroe Raven is nearer the latter than to *Corvus c. corax*.

### **Corvus corax corax.**

- Corvus corax* Linn., *Syst. Nat.*, ed. x, p. 105, 1758. Sweden.  
*Corvus maximus* Scopoli, 1769. Linnaeus' *Corvus corax*.  
*Corvus clericus* Sparrm., 1876. Variety with white chin.  
*Corvus sylvestris* Brehm, 1831. Renthendorf, Germany.  
*Corvus peregrinus* Brehm, 1831. Renthendorf, Germany.  
*Corvus littoralis* Brehm., 1831. Rügen.  
*Corvus montanus* Brehm., 1831. Tyrol.  
*Corax nobilis*, *pityocorax*, *planiceps*, *minor* Brehm., nomina nuda.  
*Corax sylvestris minor* Brehm, *J. f. O.*, 1860, p. 233. Switzerland.  
*Corvus corax dardaniensis* Gengler, *Orn. Monatsb.*, 1918, p. 110. Servia.

*Adults*.—Precisely similar to *Corvus corax tibetanus*, but generally smaller, some specimens being indeterminate.

#### *Measurements.*

Number examined.	Locality.	Wing. mm.	Culmen :	
			Length. mm.	Depth. mm.
17	British Islands . . .	394-445	74-84	28-32
2	Outer Hebrides . . .	387, 390	70, 71	29
19	Scandinavia. . . . .	405-445	72-85	29-33
4	Denmark . . . . .	423-445	76-79	31-33
2	Switzerland . . . . .	410-421	73-76	31
2	Hungary . . . . .	415, 452	70, 78	29, 31
5	Macedonia (Stres.) . . .	384-438	—	—
2	Crete . . . . .	424	75-77	30
1	Trebizond, Asia Minor . . .	—	—	—
1	Crimea . . . . .	423	80	27
3	Yenesay Valley . . . . .	410-432	71-80	27-29

*Distribution*.—Europe except Spain, Crete, north coast Asia Minor, and western Siberia as far as the Yenesay Valley.

No migration recorded, though birds occasionally wander in winter.

### **Corvus corax hispanus.**

- Corvus corax hispanus* Hart. & Kleinschm., *Nov. Zool.*, 1901, p. 45. Aguilas, Murcia, Spain.  
*Corvus sardus* Kleinschm., *Orn. Monatsb.*, 1903, p. 92. Sardinia.

*Adults*.—Similar to *Corvus c. corax*, but smaller. Bill strong and deep as in *C. c. corax* and markedly thicker than the bill of *Corvus c. tingitanus*. I am unable to distinguish from this race birds from Sardinia and Cyprus.

#### *Measurements.*

Locality.	Wing. mm.	Culmen :	
		Length. mm.	Depth. mm.
5. Spain . . . . .	410-430	67-73	27-31
3. Sardinia . . . . .	411-436	68-76	28-31
8. Cyprus . . . . .	401-434	66-74	27-30

*Distribution*.—Generally distributed in Spain and Portugal, Sardinia and Cyprus, and Balearic Islands. Corsican birds are also said to belong to this race. ? Sicily and southern Italy.

**Corvus corax tingitanus.**

*Corvus leptonyx* Peale, *U.S. Expl. Exped.*, p. 105, 1848. Madeira. Identity uncertain. No raven occurs on Madeira.

*Corvus tingitanus* Irby, *Ibis*, 1874, p. 264. Tangier, Morocco.

*Corvus corax canariensis* Hart. & Kleinschm., *Nov. Zool.*, 1901, p. 45. Palma, Canary Islands.

*Adults.*—Differs from *Corvus corax corax* and *hispanicus* in its shorter stumper bill. Throat hackles less elongated and lanceolated. Plumage of upper-parts more inclined to a dark oily blue. Bases of feathers grey and usually darker than in *C. c. laurencei* and *ruficollis*.

Smaller wing than is usual in *C. c. corax*.

I am unable to distinguish from this race birds from the Canary Islands, which are said to have a slenderer though higher culmen and stronger feet, and less pointed throat hackles.

*Measurements.*

Locality.	Wing. mm.	Culmen :	
		Length. mm.	Height. mm.
19. Canary Islands . . . . .	355-428	63-73	25-29
37. Morocco and Algeria . . . . .	364-430	60-69	25-28
1. Sollum, Western Egypt . . . . .	362	63	27

*Distribution.*—Canary Islands, Morocco, Algeria, Tunis, Cyrenaica, and to Mersah Matruh in western Egypt.

**Corvus corax sinuatus.**

*Corvus sinuatus* Wagler, *Isis*, 1829, p. 748. Mexico (ex Licht. MSS.).

*Corvus cacalott* Wagler, *Isis*, 1831, p. 527. Mexico.

*Corvus major* Paul v. Würt., *Erste Reise Nord. Amer.*, 1835, p. 294. Nebraska. Nomen nudum.

*Corvus nobilis* Gould, *P.Z.S.*, 1837, p. 79. Mexico. Type in the British Museum.

*Corvus corax clarionensis* Rothsch. & Hart., *Nov. Zool.*, ix, 1902, p. 381. Clarion Island, Revillagigedo Group, Pacific Coast of the United States. Type in the Tring Museum.

*Corvus c. europhilus* Oberh., *Ohio Journ. Sci.* xviii (6), p. 215, 1918. Alabama, Eastern United States. Partim.

*Corvus corax richardsoni* Miller and Griscom, *Amer. Mus. Novit.*, No. 184, p. 5, 1925. Nicaragua.

32 examined in the British Museum and the type of "*clarionensis*" at Tring.

*Adults.*—Similar to *Corvus c. tibetanus* from Canada, but smaller and more of the size of *Corvus c. corax*, but with a distinctly slenderer and proportionately longer bill.

*Measurements.*

Number examined.	Locality.	Wing. mm.	Culmen :	
			Length. mm.	Depth. mm.
1	Guatemala . . . . .	441	72	31
18	Mexico . . . . .	409-460	73-80	27-28
2	New Mexico . . . . .	395, 440	71, 76	24, 27
1	Texas . . . . .	418	71	28
2	Colorado . . . . .	426-432	71, 77	27
4	British Columbia . . . . .	399-410	65-70	27
1	New York . . . . .	425	70	29
2	Ontario . . . . .	418, 420	75, 76	29, 30

Oberholser's "*europhilus*" was claimed to be smaller than "*principalis*" and with a relatively longer bill. 41 birds had wings 380-450 and exposed

culmens of 64–76. Such a description exactly fits birds from Mexico and the southern United States. Ridgway's measurements of specimens from Mexico and the Western States are 386–459, culmen length 64–72, almost identical with Oberholser's measurements of "*europhilus*."

Rothschild and Hartert's "*clarionensis*" was based on a single worn specimen from Clarion Island, wing 395, culmen length 64, depth 23. To separate a race on size alone when only one specimen is available is always a risky undertaking, but to do so with a Crow is almost certain failure of having one's race substantiated. As can be seen from the above table, the specimen can be matched from New Mexico or nearly so. "*Clarionensis*" may or may not be a good race, but with the present material available it seems that it is not so. Hartert ("*Types in the Tring Museum*," Nov. Zool., xxvi, 1919, p. 125) upholds the race, supporting his claim with a bird from San Benedicte Island with a wing of 390 mm. But Ridgway (*B. North and Mid. Amer.*, iii, p. 265) cites a Benedicte bird with a wing of 400, culmen length 69 and depth 25, and a Santa Catalina bird with wing 412, and culmen length 71, depth 24.<sup>1</sup>

With regard to the Nicaraguan bird recently described as *Corvus c. richardsoni*, I have examined one bird from this country (at Tring). It has an intenser violet tinge than any of the large series of *Corvus c. sinuatus* which I have examined. Mexican birds from the same locality show sometimes a violet tinge and sometimes a steel blue tinge, this depending to some degree on how the bird is held when under examination.

I am unable to follow Miller and Griseom in their remarks on the colour of American Ravens (*ibid.*, pp. 4, 5). An examination of the large series available in the British Museum and at Tring do indeed show that there is considerable variation in the iridescence of the plumage of Alaska and Greenland birds, many having the violet and many the steel-blue sheen, but no particular iridescence is constant in either the east or west of North America. Such differences in iridescence occur equally throughout the Himalayas in *Corvus corax tibetanus*. The "heavy, powerful feet" of the Greenland bird can be matched exactly by Tibetan and Alaskan birds, whilst several Greenland birds I have examined have legs no larger than "*sinuatus*" or the British Raven.

On the evidence before me I am unable to accept (even after examining over 600 Ravens) Messrs. Miller and Griseom's deductions.

*Distribution*.—N. Honduras, Guatemala, Mexico, Lower California, and generally the more arid regions of the United States south of lat. 45. North of this line birds rapidly tend towards the larger form—*tibetanus*, and no definite boundary can be given. Even within the area given for this form, birds occur which are inseparable from others from Alaska.

The area over which birds which are indeterminable or intermediate are found is immense. To promote such birds to subspecific rank is to my mind a wrong interpretation of the facts. They had better be shown as *C. c. tibetanus* > *sinuatus* or *C. c. sinuatus* > *tibetanus*, or *C. c. tibetanus* × *sinuatus*. But should there be any area where specimens are found to be constant and almost invariably determinable, then by all means name them. Such has not been the case, and I very much doubt whether further research will help us much.

<sup>1</sup> Ridgway (*B. North & Mid. Amer.* iii, p. 265), recognising "*clarionensis*," gives its range as Clarion and San Benedicte Islands, San Clemente and Santa Catalina Islands, and the Santa Barbara Group. Oberholser extends "*clarionensis*" over parts of south-western United States.

The danger of an average measurement among such birds as Crows must be apparent. A few dwarfs or giants in a series would appreciably alter an average figure and give misleading results. I would guarantee that the average figure of European Ravens' wings in American Museums, in the British Museum, and at Tring, would give three remarkable results, and the "average splitter" might with equal reason give these three series three different names.

Further, it cannot be right or scientific to give birds from any area a name when the majority of individuals cannot be identified with certainty if the locality were erased from the label. This applies to "*europophilus*," "*clarionensis*," and all the synonyms of "*tibetanus*."

### *Corvus corax laurencei*.

*Corvus laurencei* Hume, *Lahore to Yarkand*, p. 335, 1873. Punjab.

*Corvus subcorax* Sewertzoff, *Turkest. Jevotn.*, p. 63, 115, 1873. North-west and south-east parts of Turkestan.

79 examined.

*Adults*.—In fresh plumage they are scarcely separable from *Corvus c. corax* and small examples of *Corvus c. tibetanus*, but the feather bases are usually whiter, the throat hackles shorter, and the upper parts with more of an oily wash. Birds soon change, assuming more or less copper colour on the nape, mantle, and throat. In worn plumage birds, especially from N.W. India, Beluchistan, and Persia, are sometimes indistinguishable from examples of *Corvus c. ruficollis*. In Palestine, however, where birds do not wear to such an extent, there can be no confusing the two races, which occur together at Jerusalem throughout the year except for a month or so when they are nesting.

#### *Measurements.*

Number examined.	Locality.	Wing. mm.	Culmen:	
			Length. mm.	Depth mm.
16	Palestine . . . .	396-446	66-80	27-30
5	Mesopotamia . . . .	419-440	70-80	27-29
1	Southern Kurdistan . . . .	434	79	30
5	South-east Persia . . . .	420-449	70-74	25-29
8	Northern Beluchistan . . . .	400-450	67-77	24-28
10	Southern Afghanistan . . . .	407-462	71-79	23-27
1	Chinese Turkestan . . . .	430	69	27
1	Teheran (Blanford) . . . .	455	—	—
3	Sind . . . . .	389-430	66-70	23-26
13	Punjab . . . . .	398-437	67-74	23-27
17	Rajputana . . . . .	390-434	67-75	23-26

Birds from the last three localities average considerably smaller in wing and bill than more westerly birds.

*Distribution*.—Generally N.W. India from Rajputana to Sind and the Punjab, Beluchistan, East Persia, Iraq, Syria, and Palestine. Perhaps Asia Minor. Cyprus birds are nearer "*hispanus*" than "*laurencei*." Birds from East Greece are said to belong to "*laurencei*" (Reiser, *Orn. Balc.*, iii), but I have not seen specimens. Festa and Salvadori record this race from Rhodes Island.



**Corvus corax ruficollis.**

*Corvus ruficollis* Lesson, *Traité d'Orn.*, p. 329, 1831. No locality. The type is in the Paris Museum and probably came from the Cape Verde Islands. Pucherans' citation of "Cape" is an obvious error.

*Corvus unbrinus* Sundevall, *Oef. k. Vet. Akad. Forh. Stock.*, 1838, p. 199. Sennar (ex Hedenborg MSS.).

*Corvus infumatus* Wagner, *Munch. gel. Anz.* viii, 1839, No. 37, p. 301. "Egypt," but according to Parrot from El Tor in Sinai.

*Corvus fuscicollis, nigricollis, crassirostris, minor* Brehm., *Ferz. Samml.*, p. 3, 1866. Nomina nuda. *Corvus corax krausei* Zedlitz, *Orn. Monatsb.*, 1908, p. 178. El Tor in Sinai.

109 examined.

*Adults.*—Usually a slenderer bill than in "*laurencei*" and in fresh plumage with a copper tinge over the whole head and body plumage. Bases of feathers light grey to whitish or even paler than in "*laurencei*." As plumage becomes worn the copper tinge becomes accentuated. Nasal plumes often shorter than in "*laurencei*."

*Immature.*—As the adult, but with very small trace of a copper tinge, which is only assumed after the first autumn moult.

The wing of this form shows a slightly different structure to that of other forms. The 1st and 6th primaries are relatively shorter which gives a narrower, more pointed outline to the outstretched wing. This difference, though usual is by no means constant. The eggs of this race are also remarkable for their small size, being scarcely larger than those of *Corvus cornix* or *corone*. These and the fact that this form and "*laurencei*" are frequently found together has induced ornithologists to keep "*ruficollis*" as a separate species. But the two forms are not known to breed in the same area and they intergrade so perfectly that some individuals are indeterminable.

*Measurements.*

Specimens examined.	Locality.	Wing. mm.	Culmen :	
			Length. mm.	Depth. mm.
15	Cape Verde Islands . . .	363-378	61-64	20-24
7	Algerian Sahara . . .	366-389	63-68	21-24.5
15	South Algeria (Geyr) . . .	356-410	57-69	20-25
2	Asben, South Sahara . . .	408	—	—
1	Northern Nigeria . . .	384	64	22
2	Siwa Oasis, W. Egypt . . .	395, 406	66, 70	23, 24.5
7	Lower Egypt and Suez . . .	367-420	61-73	20-24
9	Upper Egypt . . .	365-418	64-73	21.5-25
5	Khartoum . . .	373-412	67-69	20-23
4	Socotra . . .	350-395	63-75	24-25
15	South Arabia, Muscat . . .	353-414	57-75	20-26
17	South Palestine . . .	366-412	61-68	21-25
10	East Persia and India . . .	370-413	62-70	21-25.5
12	Sinai Peninsula, Nekhl, Tor . . .	355-405	57-66	21-25

On these measurements I am unable to substantiate "*infumatus*." See also *Ibis*, October 1921, p. 623, where the question is further discussed in greater detail.

This race shows great variation, not only in size, but in the density of the copper tinge of the plumage, but such variation is not constant in any one area.

*Distribution.*—Generally from the Cape Verde Islands, throughout the

Sahara Desert to the Nile, but always in desert areas, and south to N. Nigeria at Sokoto to Sinai and the Dead Sea Depression. Absent from Petra, but present at Jerusalem, breeding in the vicinity. Not observed much north of Jericho. The east and south coast of Arabia, Sudan (desert only) to Muscat. Of doubtful occurrence in Iraq, though there is a worn specimen labelled "Mesopotamia" in the British Museum. Socotra. East Persia (Seistan), Persian and British Beluchistan, and occasional to Sind. In East Africa Van Someren (Nov. Zool., 1922, p. 125) reported it from the Suk and Kavirondo country as uncommon, and Reichenow (*Vog. Afr.*, ii, p. 633) records birds from Shoa, Kavanga in Kavirondo, and Barawa at lat. 4 North on the Juba River.

Common in southern Afghanistan, at least in winter, and is reported to breed in the Aral-Caspian region (Susehkin, *J. f. O.*, 1914). Zarudny obtained one in the Ilezk District, Orenburg (Grote, *J. f. O.* 1919).

In Central Asia Loudon reports them as resident in the Kara Kum between Merv and the Oxus and on the Murghab River. Zarudny reports them as breeding in the Kizil Kum, south-east of Aral.

### *Corvus corax edithae.*

*Corvus edithae* Phill., *Bull. B.O.C.* iv, p. 36, 1895. Hainwa'na Plain, Somaliland (Lort Phillips). Type in the British Museum.

8 examined, including the type.

*Adults.*—Similar to *C. r. ruficollis*, but smaller. Wing 321–356, culmen 50–52. There is a bird in the British Museum from Barawa in Italian Somaliland collected in November 1881 by Dr. Fischer, with a wing of 361 and culmen of 56 which is well within the size of typical *C. r. ruficollis*. It is one of those birds which might be referred to either race.

*Distribution.*—Common throughout British Somaliland and extending in small numbers to Ogaden (Reichenow) and Lake Rudolph.

### *Corvus splendens zugmeyeri.*

*Corvus splendens zugmeyeri* Laubmann, *Orn. Monatsb.* xxi, p. 93, 1913. Las Bela, Baluchistan.

10 examined.

*Adults.*—Forehead and crown metallic blue, throat and chin well lanceolated and of a metallic greenish blue colour. Nape, ear-coverts, and sides of the neck pale grey, gradually merging into metallic purplish blue on the mantle and to dull blackish grey on the abdomen. Tail purplish blue. Primary coverts metallic green. Bases of nape feathers white, not only in this race but in all races.

*Soft Parts.*—Iris dark brown, bill and legs black.

*Measurements.*—Wing 257–284, culmen 43–53.

*Distribution.*—The whole of Sind, east to the western Punjab, north to Kashmir and south to Karachi and along the Mekran Coast. Absent from the hills of Northern Baluchistan.

Specimens closely resembling this race occur at Muscat, and it is not clear whether they have been introduced or not.

**Corvus splendens splendens.**

*Corvus splendens* Vieillot, *Nouv. Dict. d'Hist. Nat.* viii, 1817, p. 44. Bengal.

*Corvus splendens* var. *impudicus* Hodgson in Gray's *Zool. Misc.*, p. 84. Nomen nudum. No locality. 1844.

*Anomalocorax impudicus* Hodgson, in Gray's *Handlist*, ii, p. 14, 1870. Nomen nudum.

58 examined.

*Adults.*—Markedly paler in its grey pattern than either *protegatus* or *insolens*. Darker and browner on nape, neck, ear-coverts; and upper breast than *zugmeyeri*.

*Soft Parts.*—Iris dark brown, legs and bill black.

*Measurements.*—Wing 253–284, culmen 45–52 mm. Some birds from Khatmandu in Nepal run up to 300 on the wing, but such huge birds are exceptional in that area. Perhaps in a large series from Nepal the average wing measurement would be greater than that of others from India.

*Distribution.*—The whole of India south of the Himalayas, west to the eastern Punjab, Rajputana, and Baroda. East to Nepal, Darjeeling and Gangtok in Sikkim, and Assam. South to Travancore, Mysore, and the Nilgiri Hills.

Whilst most birds from Assam are typical of this race, others show a distinct tendency towards *insolens*.

Birds occur in parts of the Himalayas at medium elevations, but very locally, but in Sikkim they occur sparingly to almost 8,000 ft.

Introduced to Zanzibar, Mauritius, and Aden.

**Corvus splendens protegatus.**

*Corvus splendens protegatus* Madarasz, *Orn. Monatsb.* xii, p. 195, 1904. Colombo, Ceylon.

5 examined.

*Adults.*—Differs from *insolens* in being a paler bird, and from *C. s. splendens* in having the grey portion of the plumage darker.

*Soft Parts.*—Iris dark brown, feet and bill black.

*Measurements.*—Wing 217–275, culmen 44–48.

*Distribution.*—Apparently confined to Ceylon.

**Corvus splendens maledivicus.**

*Corvus splendens maledivicus* Reichenow, *Deutsch. Tief-See Exped. Vogel*, p. 356, 1904. Southern Maldives.

None examined. This race was described apparently from a single specimen. Is said to be near *C. s. splendens*, but the neck, sides of head and breast are almost pure slate grey with scarcely any brown. Also greyer and darker than the typical form, but paler than *insolens*. Lower parts somewhat darker than *C. s. splendens*. Wing 283 mm.

There are in the British Museum three males from the Laecadive Islands with wings 232–260 and culmens 43–50 mm. Two of these are slightly darker than *C. s. splendens*, whilst a third is as dark as *insolens*. It seems likely that these birds belong to *maledivicus*.

**Corvus splendens insolens.**

*Corvus insolens* Hume, *Stray Feathers*, ii, 1874, p. 480. Tenasserim.

33 examined.

*Adults.*—The darkest of the group, the grey on the nape, sides of the neck, and upper breast being replaced by dull lead colour.

*Soft Parts*.—Iris dark brown. Bill and legs black.

*Measurements*.—Wing 230–278 mm., culmen length 42–50.

*Distribution*.—From Tenasserim north to Moulmein, Rangoon, Mandalay, but not extending into the hills of the Shan States. Also Siam.

### **Corvus cornix cornix.**

*Corvus cornix*, Linn., *Syst. Nat.*, ed. x, p. 105, 1758. Sweden.

*Corvus cinereus* Leach, 1816. Nomen nudum.

*Corvus subcornix* Brehm, 1831. Germany.

*Corvus cinereus* Brehm, 1831. Central Germany.

*Corvus tenuirostris* Brehm, *Vogelfang.*, p. 57, 1855. Germany.

*Corvus cornix vulgaris, planiceps* Brehm., 1866. Nomina nuda. For detail of above see Hartert, *Vög. Pal.*, i, p. 9.

*Corvus lacmeisteri* Kleinschmidt., *Falco*, xiv, p. 8, 1919. Germany. Variety with grey primary coverts.

*Adults*.—Head, neck, throat, wings, and tail black glossed with purple. Rest of plumage ash-grey, the feathers with darker shaft stripes. According to the locality and the bleaching properties of the climate, the grey quickly fades to a dirty brownish or whitish grey.

*Soft Parts*.—Iris dark brown, bill and feet black.

*Measurements*.—Wings of over 100, from 305 in females to 340 in males. Culmens length 49–60, height at base 19–22 mm.

*Summer range*.—The typical race breeds in Ireland, Scotland, the Outer Hebrides, rarely in Holland, in Denmark, the whole of Scandinavia, Finland, Russia, in Germany east of the Elbe, Balearic Islands, Central and Southern Italy, Sicily, Hungary, Poland, Monte Negro, and east probably to the Urals, though the exact boundary between this race and *C. cornix sharpii* is not yet known. Birds from the Caucasus are probably “*sharpii*.” Resident in the southern part of its range.

*Migration*.—Birds from Northern and Central Europe move south-west and west respectively in the autumn. Passage occurs from the end of September (rarely from late August) to November when birds spread over the British Islands, Northern France, and to Belgium and western Germany. Has straggled to Malta, Egypt, Iceland, Greenland, and Spitsbergen.

Spring passage commences in early March, birds being rarely seen out of their breeding haunts after the first week in April, though spring passage has been noted in the British Islands as late as 12. v.

### **Corvus cornix sardonius.**

*Corvus aegyptiaca* Brehm, *J. f. O.*, Extraheft, p. 8, 1853. Nomen nudum.

*Corvus sardonius* Kleinschmidt, *Orn. Monatsb.*, 1903, p. 92. Sardinia.

*Corvus cornix vallachus* Tschusi, *Orn. Jahrb.*, 1904, p. 121. Rumania.

*Corvus cornix balcanicus* Rzehak, *Orn. Monatsb.*, 1906, p. 189. Servia.

*Corvus cornix syriacus* Gengler, *J. f. O.*, 1919, p. 221. Jerusalem.

*Corvus cornix judaeus* Meinertz., *Bull. B.O.C.*, xxxix, p. 85, June 1919. Palestine.

*Adults*.—In fresh autumn plumage, precisely similar to *Corvus c. cornix*, but generally smaller. For detailed measurements see *Ibis*, October 1921, p. 625. Owing to a hotter and drier climate birds bleach quicker.

*Measurements*.—Wings of 11 Balkan birds, 280–333.

Wings of 22 Palestine birds, 278–324 mm.

Wings of 41 Egyptian birds, 286-332 mm.

Wings of 18 Sardinian and Corsican birds, 301-329 mm.

Culmens vary from 42-59 in length and from 16-22 in depth.

*Range*.—Perhaps Balearic Islands, Sardinia, Corsica, the Balkans, from Rumania and Servia south to Greece, where they are rare, probably Asia Minor, Syria, Palestine, and Egypt. Probably also the Crimea. No migration has been observed.

### **Corvus cornix sharpii.**

*Corvus sharpii* Oates, *Fauna Brit. India, Birds*, i, p. 20, 1889. Siberia.

*Corvus cornix* var. *christophi* Alpheraky, *Mess. Orn.*, i, p. 164, 1910. Sea of Azov. Erythristic variety.

? *Corvus cornix kaukasicus* Gengler, *J. f. O.*, Apr. 1919, p. 221. Caucasus. Based on 1 specimen.

*Adults*.—As *Corvus c. cornix*, but the grey is slightly paler and slightly more brownish.

*Measurements*.—Wings of 47 birds from 314 in females to 345 in males. Culmen length 49-59, height 19-23.

*Distribution*.—Probably east of a line from the Ural Mountains to east of the Caspian and Persia. Breeds in Russian but not Chinese Turkestan. East to the Yenesay River and becoming scarcer towards Lake Baikal but not further east. North to the Arctic Circle. Also breeds on the western Altai Mountains. Birds from the Caucasus probably belong to this race.

*Migration*.—A considerable south and south-west movement in autumn when they become abundant in Trans-Caspia, throughout Persia, Mesopotamia, Kurdistan, Afghanistan, and extreme N.W. India. Passage has been noted across the Pamirs in October, and migrants arrive at Samarkhand from the north at the end of October. In Iraq birds begin to arrive near Baghdad in early November.

Spring passage has been noted in Trans-Caspia from 23.ii, but not after 10.iv. Birds leave Iraq during March, few being seen after that month.

### **Corvus cornix minos.**

*Corvus cornix minos* Meinertz., *Bull. B.O.C.*, p. 19, Nov. 1920. Crete.

*Adults*.—A much paler bird than even *C. c. sharpii* and nearest to *C. c. pallescens* from Cyprus, but larger than the latter. Wings of 5 from 313 in females to 327 in males. Culmen length 55-61, height 20-22 mm.

*Distribution*.—Confined to Crete where they are resident.

### **Corvus cornix pallescens.**

*Corvus cornix pallescens* Madarasz, *Orn. Monatsb.*, 1906, p. 528. Cyprus.

*Adults*.—Similar to *Corvus c. minos*, but smaller. Wings of 7, 285-314 mm., culmens length 47-53, height 17-20 mm.

*Distribution*.—Resident in Cyprus.

### **Corvus cornix capellanus.**

*Corvus capellanus* Sclater, *Proc. Zool. Soc. London*, 1876, p. 694. Fao, Persian Gulf.

*Adults*.—The grey of preceding races is replaced by very pale almost milky grey in fresh plumage, which soon fades to almost white. Living birds sometimes have a slight pink blush on the white plumage.

*Measurements.*—A much heavier bird than any of the other forms. Wings of 24 vary from 329 to 358, culmens length 50–62 mm.

*Distribution.*—Mesopotamia and the extreme south-west of Persia, north to Ramadi on the Euphrates, Samarra on the Tigris, and to Khanikin and Kirkuk in southern Kurdistan. Also up the Karun River to Ahwaz and along the Gulf Littoral towards Bushire. Where this race meets *Corvus c. sharpii* in South-west Persia they inter-breed and a slight overlap occurs. Resident.

#### RELATIONSHIP BETWEEN *Corvus corone* AND *Corvus cornix*.

In examining the distribution of these two forms it is remarkable how in nearly every case the one displaces the other throughout their ranges, and it is rare that the two forms should breed in the same area. The few areas where they interbreed are Scotland, Denmark, roughly the Elbe Valley as far as Bohemia, in parts of the Western Altai Mountains, in the valley of the Yenesay, and between Tomsk and Lake Baical. Elsewhere throughout their combined ranges, there is a clear-cut line between their respective breeding ranges.

Wherever the two forms breed in the same area they inter-breed and hybrids occur. Such hybrids have been examined from many parts of Scotland, from Yarkand (doubtless a migrant, as *C. cornix* does not breed in Chinese Turkestan), from the Yenesay, from the Elbe Valley, Denmark, and Bohemia. These hybrids are fertile and bring up offspring as was proved by Seebohm in the Yenesay Valley, and recently in Scotland a breeding pair were shot, one of which was pure *Corvus corone* and the other a hybrid. In Argyllshire the majority of breeding crows are not pure.

The simplest explanation of a problem is usually the correct one, and in this instance I am inclined to think that where the two forms meet they interbreed. I regard the two forms as well-defined species or units and not as races of the same species. This latter view is largely held on the Continent, and appears to be based on the fact that the one form displaces the other almost throughout their respective ranges. I should sooner explain this by the fact that *Corvus cornix* is a plain species, whereas *Corvus corone* is a hill, forest-loving species. *Corvus cornix* is looked upon in Western Europe as a shy bird confined to wild moorland. Continual persecution has compelled him to adopt this role. But where the Hooded Crow is found and is not persecuted we see him as he really is, as a village crow, scavenging round towns, breeding in towns, and with quite different habits to *Corvus corone*. *Corvus corone* is not a "village crow" anywhere throughout its range. It is true that it has established itself in the heart of London, but even there he is wild.

It is a more reasonable explanation that the two species do not associate amicably and that the Hooded Crow, being the stronger bird, makes himself objectionable to *Corvus corone*. Similar instances are known among *Passer domesticus* and *montanus* and among *Corvus monedula* and *Pyrhocorax pyrrhocorax*.

For the Continental views on this subject see also *J. f. O.*, 1887, pp. 619–648, and Geyr, *Falco*, 1920, pp. 17–26.<sup>1</sup>

<sup>1</sup> Since writing above I am inclined (1926) more to the view that *C. corone* and *C. cornix* must be treated as one and the same species.

**Corvus corone corone.**

*Corvus corone* Linn., *Syst. Nat.*, ed. x, p. 105, 1758, England.

*Corvus subcorone* Brehm., 1831. Central Germany.

*Corvus hyemalis* Brehm., 1831. Central Germany.

*Corvus assimilis* Brehm., 1855. Germany.

*Corone andayensis*, Olphe-Galliard, variety.

*Corvus corone helveticus* Brehm, *J. f. O.*, 1860, p. 233. Freiburg.

*Corvus corone major, minor, longirostris, brevisrostris, intercedens, and montanus* Brehm, 1866. Nomina nuda. For detail of above see Hartert, *Vög. Pal. Fauna*, i, p. 11.

*Adults.*—Whole plumage black with purple sheen on upper-parts. Nasal plumes well developed, and completely covering nostrils. Base of feathers dark grey.

*Soft Parts.*—Iris dark brown, bill and feet black.

*Measurements.*—Wing of 64, 304 to 334, culmen 47–59 mm.

*Distribution.*—England, Wales, Scotland though rare in the north, France, Spain (rare in the south), Northern Italy, Switzerland, Tyrol and western Europe west of the Elbe, Holstein, and Denmark. Very local in Russia. The Caucasus.

*Migration.*—Has straggled to the Azores. A considerable southern movement takes place in autumn when large flocks have been reported from Scotland in November, January, and March. Flocks have also been reported from south-west France on 24.ii. A scarce winter visitor to Corsica, and a common winter visitor to Sicily. Witherby reported them as common in the Cantabrian Mountains in October.

**Corvus corone orientalis.**

*Corvus orientalis* Eversmann, *Add. Pall. Zoogr. fasc.* ii, p. 7, 1841. Naryn River, Central Asia.

*Corvus corone interpositus* Laubmann, *Verh. Orn. Ges. Bay.* xiii, 2, p. 201, 1917. Hondo, Japan. Smaller wings, 305–341 mm.

*Corvus corone yunnanensis* La Touche, *Bull. B.O.C.* xliii, 1922, p. 43. Mengtz, S.E. Yunnan.

*Adults.*—In all respects a larger bird than *Corvus c. corone* and frequently not so intensely coloured. I am unable to separate birds from Japan on measurement, though a few small individuals do occur there. On the other hand most Japanese birds are as large as Central Asiatic examples.

Two topo-typical examples have been examined of La Touche's "*yunnanensis*." Their bills are not less convex nor more slender than others from Japan, Gilgit, and Turkestan, neither can I trace any green on the mantle. It is true that lanceolation on the throat is well marked, but not more so than in fully adult specimens from Central Asia. The under-parts do not differ from examples in similar plumage from other parts of Asia.

*Measurements.*—Wing of 44 examples 314 to 362, culmen length 49–64, height 20–23 mm.

*Distribution.*—Probably the whole of northern Asia east of the Yensay River and the Upper Oxus. South to North Kashmir,<sup>1</sup> Gilgit, Ladak, Szechwan, and S.E. Yunnan. Has bred (?) in the Kurram Valley (Whitehead).

*Migration.*—Considerable southward movement in winter when birds occur in N.W. India. They remain north of the Arctic Circle till late October. On the Sea of Japan passage has been noted in October, and in the Gulf of Pechili an east to west migration has been noted in late October and November.

<sup>1</sup> Breeding doubtful.

Spring passage has been noted in Corea and in the Gulf of Liautung on 20.iii. In Dauria and Northern Manchuria they commence arriving from the end of March.

In China birds occur in winter south to Foochow.

### **Corvus torquatus.**

*Corvus torquatus* Lesson, *Traité*, p. 328, 1831. "New Holland" in error. China apud Schlegel.  
*Corvus pectoralis* Gould, *P.Z.S.*, 1836, p. 18. China. Type examined in British Museum.

Over 50 examined.

*Adults*.—Whole plumage glossy purplish black. Nape, upper back, sides of the neck, and a horse-shoe shaped band across the breast, white, the feathers frequently with black or darker markings. Base of nape feathers pale grey. Nasal bristles straight and reaching to about the centre of the culmen and covering the frontal base of the culmen. 1st primary about equal to the longest secondaries, though frequently slightly shorter. Throat feathers well lanceolated.

*Immature*.—What I take to be an immature bird is a specimen in the British Museum from the Tsing Ling Mountains. It almost lacks the white band underneath, and the white collar above is replaced by grey feathers with black tips, which gives a heavily streaked appearance to the back of the neck and upper back.

*Soft Parts*.—No record.

*Measurements*.—Wing 283–355, but usually between 320 and 350. Culmen 56–62 mm. Depth of culmen 19–23 mm.

*Distribution*.—China. Birds examined from the Tsinling Mountains, Kiukiang, Amoy, Hunan, Canton, Kiang-su, Fohkien, Foochow, Kwantung, Tonking, Lower Yangtse, and Hainan.

A migrant from the northern part of its range, and has been observed on passage in south-west Manchuria, and in Chili Province near Peking.

Formosa.

### **Corvus albus.**

*Corvus albus* Müller, *Syst. Nat. Suppl.*, p. 85, 1776. Senegal.

*Corvus scapulatus* Daud., *Traité*, ii, p. 232, 1800. No locality.

*Corvus scapularis* Leach in Tuckey, *Exped. to Congo*, p. 407, 1818. River Congo in Central Congo.

*Corvus scapularis* var. *aethiops*. Hemp. & Ehr., *Symb. Phys. Icones Avium*, 1828. Nubia and Dongola.

*Corvus curvirostris* Gould, *P.Z.S.*, 1836, p. 18. East Africa. Founded on a small specimen.

*Corvus leuconotus* Swainson, *B. of West Afr.* i, p. 133, pl. v, 1837. Senegal.

*Corvus phaeocephalus* Cabanis, *Mus. Hein. Th.* i, p. 232, 1851. Abyssinia. Founded on two large specimens.

*Corvus madagascariensis* Bonaparte, *Compt. Rend.* xxxvii, p. 829, 1853. Madagascar. Said to be smaller and with a stronger bill.

132 examined.

*Adults*.—Breast white and with a broad white collar passing from the upper breast over the back. Abdomen, head, throat, and rest of plumage glossy steel-black. Feathers of throat strongly lanceolated. Base of feathers white. Nasal bristles well-developed and reaching to or slightly beyond proximal half of culmen, covering frontal base of culmen for from 10 to 20 mm.

*Soft Parts*.—Iris brown. Bill and feet black.

*Immature*.—As adult, but the white of the upper parts is mottled with



brown, and the white of the under-parts is dirty. Rest of under parts dirty brown-black. No gloss on head.

*Measurements.*

Specimens.	Locality.	Wing. mm.	Gulmen :	
			Length. mm.	Height. mm.
10	South Africa S. of the Zambesi . . . . .	325, 345-360	52-60	21-22
3	Lower Zambesi and Mozambique . . . . .	325-352	56-58	22, 24
2	Rhodesia . . . . .	330, 348	56, 58	23, 24
11	Angola . . . . .	325-365	54-59	23-25
3	Nyasaland . . . . .	358-366	57-60	23-24
8	Madagascar . . . . .	321, 341-359	53-59	23-24
8	Aldabra . . . . .	330-364	53-60	23-25
11	Comoro Isles . . . . .	318-365	52-59	21-24
1	Assumption Island . . . . .	324	56	—
1	Zanzibar . . . . .	294	54	—
7	Kenya Colony, Uganda, and Kilimanjaro . . . . .	336-363	52-62	22-26
27	Northern and Southern Nigeria, Sierra Leone, Liberia, Gambia, and Congo . . . . .	330-378	52-62	22-26
10	Fernando Po . . . . .	315-360	51-60	22-25
3	British Somaliland . . . . .	346-360	56-64	22-26
8	Abyssinia . . . . .	330, 354-382	53-63	21-24
11	Sudan . . . . .	314, 315, 331-355, 371	53-64	22-24

*Distribution.*—Occurs in South Africa from the south coast to Natal and the Transvaal, but apparently not in the western portions of Cape Colony. Thence throughout Africa to Angola in the west and Abyssinia in the east, though not in the Somali desert. Throughout the Congo to West Africa north to the Southern Sahara at Asben and on the coast at least to the Gambia. Common throughout Kenya Colony and Uganda and north to the Sudan at least to Shendi. Occurs in Abyssinia at least to Addis Abeba. Also Madagascar, Aldabra, Comoro, Assumption, Zanzibar, and Fernando Po.

*Note.*—Are *C. torquatus* and *C. albus* but races of *C. corone* ?

APPENDIX A.

LIST OF SCIENTIFIC NAMES APPLIED TO THE GENUS *CORVUS*,  
ARRANGED ALPHATETICALLY, THE SECOND NAME BEING THE  
SPECIES TO WHICH THE FIRST NAME HAS BEEN APPLIED.

*advena*—*frugilegus*.  
*advena*—*typica*.  
*aegyptiaca*—*cornix*.  
*aethiops*—*albus*.  
*affinis*—*coronoides*.  
*affinis*—*rhipidurus*.  
*agricola*—*frugilegus*,

*agrorum*—*frugilegus*.  
*albicollis*—*albicollis*.  
*albus*—*albus*.  
*alticeps*—*monedula*.  
*americanus*—*brachyrhynchos*.  
*andamanensis*—*coronoides*.  
*andayensis*—*corone*,

*angustirostris*—*frugilegus*.  
*unnectens*—*coronoides*.  
*anthracina*—*coronoides*.  
*arborea*—*monedula*.  
*assimilis*—*corone*.  
*australis*—*coronoides*.

*bacmeisteri*—*cornix*.  
*balcanicus*—*cornix*.  
*bennetti*—*coronoides*.  
*bonhoti*—*coronoides*.  
*brachyccercus*—*rhipidurus*.  
*brachyrhynchos*—*brachyrhynchos*.  
*brachyrhynchos*—*rhipidurus*.  
*brachyurus*—*rhipidurus*.  
*brevicaudatus*—*rhipidurus*.  
*brevipennis*—*coronoides*.  
*brevirostris*—*corone*.

*cacalotl*—*corax*.  
*cafer*—*albicollis*.  
*canariensis*—*corax*.  
*capellanus*—*cornix*.  
*capensis*—*cupensis*.  
*capitulis*—*dauuricus*.  
*carnivorus*—*corax*.  
*caurinus*—*brachyrhynchos*.  
*ceciliae*—*coronoides*.  
*christophi*—*cornix*.  
*cinereus*—*cornix*.  
*cirtensis*—*monedula*.  
*clarioneensis*—*corax*.  
*clericus*—*corax*.  
*collaris*—*monedula*.  
*colonorum*—*coronoides*.  
*compiler*—*enca*.  
*connectens*—*coronoides*.  
*corax*—*corax*.  
*cornix*—*cornix*.  
*corone*—*corone*.  
*coronoides*—*coronoides*.  
*crassirostris*—*cornix*.  
*crassirostris*—*frugilegus*.  
*crassirostris*—*crassirostris*.  
*crassirostris*—*monedula*.  
*cryptoleucus*—*cryptoleucus*.  
*culminatus*—*coronoides*.  
*curvirostris*—*albus*.

*dardaniensis*—*corax*.  
*dauuricus*—*dauuricus*.  
*dominicensis*—*leucognaphalus*.  
*edithae*—*corax*.  
*enca*—*enca*.  
*erythrophthalmus*—*leucognaphalus*.  
*euophilus*—*corax*.

*fallax*—*enca*.  
*ferroensis*—*corax*.  
*florensis*—*florencis*.  
*floridanus*—*brachyrhynchus*.  
*frugilegus*—*frugilegus*.  
*frugivorus*—*brachyrhynchos*.  
*fuscicapillus*—*fuscicapillus*.  
*fuscicollis*—*corax*.  
*fuscicollis*—*dauuricus*.

*granorum*—*frugilegus*.  
*grebnitzkii*—*corax*.  
*gregarius*—*frugilegus*.

*hainanus*—*coronoides*.  
*hassi*—*coronoides*.  
*hawaiensis*—*hawaiensis*.  
*helmatrinus*—*coronoides*.  
*helreticus*—*corone*.  
*hertogi*—*coronoides*.  
*hesperis*—*brachyrhynchos*.  
*hispanus*—*corax*.  
*hyemalis*—*corone*.

*impudicus*—*splendens*.  
*impudiens*—*splendens*.  
*infumatus*—*corax*.  
*insolens*—*splendens*.  
*insularis*—*coronoides*.  
*intercedens*—*corone*.  
*intermedius*—*coronoides*.  
*interpositus*—*corone*.  
*islandicus*—*corax*.

*jamaicensis*—*jamaicensis*.  
*japonensis*—*coronoides*.  
*judaeus*—*cornix*.

*kamtschaticus*—*corax*.  
*kaukasicus*—*cornix*.

*khamensis*—*dauuricus*.  
*kordofanensis*—*capensis*.  
*krausei*—*corax*.  
*kubaryi*—*kubaryi*.

*latirostris*—*coronoides*.  
*laurencei*—*corax*.  
*leptonyx*—*corax*.  
*leucognathus*—*leucognathus*.  
*leucomelas*—*corax*.  
*leuconotus*—*albus*.  
*leucophaeus*—*corax*.  
*levaillantii*—*capensis*.  
*levaillantii*—*coronoides*.  
*littoralis*—*corax*.  
*longirostris*—*corone*.  
*longirostris*—*frugilegus*.  
*lugubris*—*corax*.

*macropterus*—*capensis*.  
*macrorhynchus*—*coronoides*.  
*madagascariensis*—*albus*.  
*madaraszi*—*coronoides*.  
*major*—*corax*.  
*major*—*corone*.  
*major*—*dauuricus*.  
*major*—*frugilegus*.  
*maledivicus*—*splendens*.  
*mandschuricus*—*coronoides*.  
*mariannae*—*coronoides*.  
*maritimus*—*mexicanus*.  
*marngli*—*coronoides*.  
*maximus*—*corax*.  
*meeki*—*meeki*.  
*mellori*—*coronoides*.  
*mengtszensis*—*coronoides*.  
*mexicanus*—*mexicanus*.  
*minor*—*corax*.  
*minor*—*corone*.  
*minor*—*capensis*.  
*minos*—*cornix*.  
*minutus*—*brachyrhynchus*.  
*modestus*—*euca*.  
*monedula*—*monedula*.  
*moneduloides*—*moneduloides*.  
*montanus*—*corax*.  
*montanus*—*corone*.  
  
*nasicus*—*nasicus*.

*neglectus*—*dauuricus*.  
*nigricollis*—*corax*.  
*nobilis*—*corax*.

*occidentalis*—*monedula*.  
*orientalis*—*corone*.  
*orru*—*coronoides*.  
*osai*—*coronoides*.  
*ossifragus*—*mexicanus*.

*pallescens*—*cornix*.  
*palmarum*—*brachyrhynchus*.  
*pascuus*—*brachyrhynchus*.  
*pastinator*—*frugilegus*.  
*paulus*—*brachyrhynchus*.  
*pectoralis*—*torquatus*.  
*peregrinus*—*corax*.  
*perplexus*—*coronoides*.  
*phaeocephalus*—*albus*.  
*philippinus*—*coronoides*.  
*pityocorax*—*corax*.  
*planiceps*—*corax*.  
*planiceps*—*frugilegus*.  
*planiceps*—*monedula*.  
*predatorius*—*frugilegus*.  
*principalis*—*corax*.  
*protegatus*—*splendens*.  
*pusillus*—*euca*.

*queenslandicus*—*coronoides*.

*rhipidurus*—*rhipidurus*.  
*richardsoni*—*corax*.  
*ruficollis*—*corax*.

*salvadorii*—*coronoides*.  
*samarensis*—*euca*.  
*sardonius*—*cornix*.  
*sardus*—*corax*.  
*scapularis*—*albus*.  
*scapulatus*—*albus*.  
*segetum*—*capensis*.  
*seuex*—*tristis*.  
*septentrionalis*—*monedula*.  
*sharpii*—*cornix*.  
*sibiricus*—*corax*.  
*sinensis*—*coronoides*.  
*sinuatus*—*corax*.  
*soemmeringii*—*monedula*.

*solitarius*—*brachyrhynchus*.  
*solitarius*—*coronoides*.  
*spermologus*—*monedula*.  
*splendens*—*splendens*.  
*subcorax*—*corax*.  
*subcornix*—*cornix*.  
*subcorone*—*corone*.  
*sylvestris*—*corax*.  
*syriacus*—*cornix*.

*tasmanicus*—*coronoides*.  
*tenuirostris*—*cornix*.  
*tenuirostris*—*enca*.  
*tenuirostris*—*frugilegus*.  
*tibetanus*—*corax*.  
*tibetosinensis*—*coronoides*.  
*timorensis*—*coronoides*.  
*tingitanus*—*corax*.  
*torquatus*—*torquatus*.  
*tristis*—*tristis*.  
*tropicus*—*hawaiensis*.  
*tschuiensis*—*corax*.  
*tschusii*—*frugilegus*.

*turrium*—*monedula*.  
*typica*—*typica*.

*ultimus*—*frugilegus*.  
*ultracollaris*—*monedula*.  
*umbrinus*—*corax*.  
*unicolor*—*unicolor*.  
*ussurianus*—*corax*.

*validissimus*—*validus*.  
*validus*—*validus*.  
*vallachus*—*cornix*.  
*varius*—*corax*.  
*vegetus*—*woodfordi*.  
*violaceus*—*enca*.  
*vulgaris*—*cornix*.  
*vulgaris*—*monedula*.  
*vulturinus*—*albicollis*.

*woodfordi*—*woodfordi*.  
*yunnanensis*—*corone*.  
*zugmeyeri*—*splendens*.

## APPENDIX B.

WING FORMULAE OF THE GENUS *CORVUS*.

Species are arranged alphabetically. Plus and minus signs are used to denote longer than or shorter than. v. sl. = very slightly, sl. = slightly, nr. = nearer. 7-8 means between the 7th and 8th primaries.

Species.	1st primary.	2nd primary.	3rd primary.	4th primary.	5th primary.	6th primary.
ALBICOLLIS . . .	7-8	5-6, nr. 5	4-5 or = 4	longest	sl. - 3	1-2, nr. 2
ALBUS . . . . .	7-8	5-6, nr. 5	longest or = 4	= longest or sl. - 3	sl. + 2	1-2, nr. 2
BRACHYRHYNCHUS:						
<i>continental</i> . . .	9-10 or = or - 10	6-7, nr. 6	v. sl. 5 or = 5	longest	v. sl. - 3 or = 3	2-3
<i>palmarum</i> . . .	= 9	6-7	= 4 and 5	= 3 and 5	= 3 and 4	2-3
CAPENSIS . . . . .	= 9	= 6 or 6-7	= longest	= longest	v. sl. - 4	= 2
CORAX:						
<i>Arctic America and   Canada</i> . . . . .	7-8 or = 8	5-6, nr. 5	= 5 or 4-5	longest	sl. - or = 3	1-2, nr. 2
<i>Iceland</i> . . . . .	7-8 or sl. - 8	5-6	4-5 or = 5	longest	= or v. sl. - 3	1-2, nr. 2

Species.	1st primary.	2nd primary.	3rd primary.	4th primary.	5th primary.	6th primary.
<i>United States</i>	7-8 or = 8	5-6	= 5	= 3 and 5 or rarely sl. longer	= 3	1-2, nr. 2
<i>East Asia</i>	7-8 or v. rarely - 8	5-6	= or sl. - 4	longest or = 3	2-3, nr. 3	1-2, nr. 2
<i>Himalayas</i> "laurenci"	7-8 or = 8 = or sl. - 7	5-6, nr. 5 5-6, but usually v. sl. = 5	4-5 or = 4 = 4 or v. sl. - 4	longest longest or = 3 or v. sl. - 3	v. sl. - 3 2-3	1-2, nr. 2 1-2, rarely nr. 2
"ruficollis".	7-8 or = 8	5-6, nr. 5	= longest	= longest	2-3	1-2
"edithae".	7-9	5-6, nr. 5	sl. + or - 4	sl. + or - 3	2-3	1-2, nr. 2
"tingitanus"	7-8 or = 8	5-6, nr. 5	4-5 or = 4	longest	v. sl. - 3	1-2, nr. 2
<i>Canary Isles</i>	usually 7-8 or v. sl. - 8	5-6	4-5 or = 4	longest	= or v. sl. - 3	1-2, nr. 2
<i>Europe</i>	7-8 or = 8	5-6	4-5 or = 5	longest	= or v. sl. - 3	1-2, nr. 2
CORNIX	9-10	6-7, nr. 6	= or v. sl. - 4	longest or = 3 or 5	= or sl. - 3 or 4	2-3
CORONE	9-10	6-7	5-6 or = 5	longest or = 5	= or sl. - 4	2-3
CORONOIDES:						
<i>Australian</i>	8-9	5-6	4-5 or = 4	longest or = 3	sl. - 3	sl. - 2
<i>Indian</i>	- 9	6-7	4-5 or = 4 or 5	longest or = 4 or 5	= 3 or 4	2-3
<i>Japanese</i>	- 9	6-7, rarely 5-6	= 4 or 5	longest or = 3 or 5	= 3 or sl. - 4	2-3 or = 2
<i>Chinese</i>	- 9	6-7 or sl. - 6	= or v. sl. - 5	longest or = 5	= 3 or 4	2-3
<i>Philippine</i>	- 10	6-7	sl. - 4	- 5 or = longest	longest or = 4	sl. - 3
<i>Java, Sumatra</i>	= or sl. - 9	= 6	= or sl. - 4	longest or = 3	sl. - 3 and 4	= 2
<i>Hainan</i>	- 8 or 9	6-7 or sl. - 6	= or v. sl. - 5	longest or = 5	= 3 or 4	2-3
<i>New Guinea</i>	- 8	6-7, nr. 6	5-6 or = 5	longest or = 5	= or sl. - 4	2-3
<i>New Britain</i>	- 9	6-7, nr. 6	5-6	longest or = 5	= or sl. - 4	2-3 or = 3
CRASSIROSTRIS	7-8 or rarely - 8	5-6	= longest	= longest	sl. - 3 and 4	1-2, nr. 2
CRYPTOLEUCUS	7-8	5-6, nr. 5	4-5 or = 4	longest or = 3	2-3	1-2, nr. 2
DAURICUS	8-9 or rarely - 9	= or sl. - 5	longest	sl. - 3	= or sl. + 2	1-2
ENCA:						
<i>enca</i>	- 9	6-7	4-6	longest or = 5	= or sl. - 4	2-3, nr. 3
<i>violaceus</i>	- 9	6-7	= 5 or 5-6	longest or = 5	= or v. sl. - 4	2-3, nr. 3
<i>pusillus</i>	- 9	= 7	= 6 or 5-6	longest or = 5	= or v. sl. - 4	= or sl. - 3
<i>samarensis</i>	- 9	= 7	5-6	longest or = 5	= or v. sl. - 4	2-3
<i>unicolor</i>	- 10	= 7	5-6	= longest	= longest	sl. - 3
FLORENSIS	- 10	= 9	6-7	5-6	longest	= or sl. - 4
FRUGILEGUS:						
<i>frugilegus</i>	8-9, but rarely - 9	5-6	= or sl. - 4	longest or = 3	2-4	sl. - 2
<i>pastinator</i>	- 9 or nearly so	= or v. sl. + 6	= or sl. - 4	usually longest	= or v. sl. - 3	sl. - 2
FUSCICAPILLUS	- 10	7-8	= 6 or very nearly so	v. sl. - 5	longest	= 3 or very nearly so.

Species.	1st Primary.	2nd Primary.	3rd Primary.	4th Primary.	5th Primary.	6th Primary.
HAWAIIENSIS . . .	- 10	sl. - 7	= or sl. - 6	= 5 or 6, rarely sl. shorter	longest or = 4	= or sl. - 4
JAMAICENSIS . . .	- 10	= 7	= 5 or 5-6	longest or = 5	3-5 or = 5	= or v. sl. - 3
KUBARYI . . .	- 10	sl. - 7	= 6	= longest	= longest	= 3
LEUCOGNAPHALUS . . .	= or - 10	6-7, nr. 6	= 5	longest	= 3	2-3
MEEKI . . .	- 10	7-8	= 6	= longest	= longest	= 3
MEXICANUS: <i>mexicanus</i> . . .	- 10	6-7, but usually v. sl. - 6	= 5	longest	= 3	2-4
<i>ossifragus</i> . . .	9-10	5-6 or = 6	sl. + or - 4	longest or sl. - 3	sl. - 4 or = 3	1 - 2 or = 2
MONEDULA . . .	= 9	= or v. sl. - 5	longest	sl. - 3	= or v. sl. + 2	1-2
MONEDULOIDES . . .	- 10	7-8 or = 8	6-7	almost = 5 and 6	usually = longest 4 and 6	almost = 4 and 5
NASICUS . . .	- 10	6-7	= 5 or nearly so	usually longest	= 3 or nearly so	2-3
RHIPIDURUS . . .	8-10	5-6	= 4 and 5 or very nearly so	= 3 and 5 or nearly so	= 3 and 4 or very nearly so	1-2, nr. 2
SPLENDENS . . .	= or - 10	= or sl. - 6	rarely longest, usually 4-5 or = 5	usually longest	sl. - 4	usually v. sl. - 2, rarely + 2
TORQUATUS . . .	- 9 or = 10	6-7	usually 4- 5, but rarely - 5	longest	sl. - 3	2-3
TRISTIS . . .	- 10	6-7 or = 7	v. sl. + or - 6	longest or very nearly so	= longest or very nearly so	v. sl. + or - 3
TYPICA . . .	- 10	6-7	= or sl. - 5	longest or = 5	= or sl. - 4	2-3
VALIDUS . . .	= or - 10	v. sl. + or - 7	5-6 or sl. - 6	sl. + or - 5	usually longest or v. sl. - 4	sl. + or - 3
WOODFORDI . . .	- 10	6-7 or = 7	5-6 or = 6	= longest	= longest	= or sl. - 3

## APPENDIX C.

## LIST OF TYPES OF AUSTRALIAN CROWS.

Name of type.	Wing.	Culmen.		Base of nape feathers.	Type locality.
		Length.	Depth.		
<i>Corvus coronoides</i> Vig. and Horsf., 1827.	363	58	—	grey.	Paramatta, N.S.W.
<i>Corvus bennetti</i> North, 1901 .	type not examined.			white.	Moolah, Western N.S.W.
<i>Corvus mariannae</i> Mathews, 1911.	345	56	22	dark grey.	Gosford, N.S.W.
<i>Corvus coronoides ceciliae</i> Ma- thews, 1912. "Smaller than <i>Corvus c.</i> <i>coronoides</i> , wing 355-356."	360	60	24	almost pure white.	Napier Broome Bay, N.W. Australia.

Name of type.	Wing.	Culmen.		Base of nape feathers.	Type locality.
		Length.	Depth.		
<i>Corvus bennetti bonholi</i> Mathews, 1912. "Smaller than <i>Corvus b. bennetti</i> . Wing 295."	298	49	19	almost pure white. An immature bird.	Murchison, West Australia.
<i>Corvus coron. perplexus</i> Mathews, 1912. "Much smaller than <i>Corvus c. coronoides</i> , wing 314-327."	316	51	23	grey.	Perth, Western Australia.
<i>Corvus benn. queenslandicus</i> Mathews, 1912. "Differs from <i>Corvus b. bennetti</i> in having a deeper and stouter bill and thicker tarsi."	320	58	24	almost pure white.	Dawson River, Queensland.
<i>Corvus mariannae mellori</i> Mathews, 1912. "Differs from <i>Corvus m. mariannae</i> in being smaller, wing 326-330, and from <i>C. b. bennetti</i> in having grey bases to the feathers."	327	54	22	dark grey.	Angus Plains, South Australia.
<i>Corvus mariannae helmaturinus</i> Mathews, 1912. "Differs from <i>Corvus m. mellori</i> by being smaller, wing 291."	295	49	19	very dark grey.	Kangaroo Island, S. Australia.
<i>Corvus mariannae tasmanicus</i> Mathews, 1912. "Differs from <i>Corvus m. mariannae</i> in its longer bill—67 mm.—typical <i>C. m. mariannae</i> having a bill 56-60."	359	67	25	grey.	Tasmania.
<i>Corvus ceciliae marngli</i> Mathews, 1912. "Shorter wing—312—and bill than <i>Corvus c. ceciliae</i> ."	316	51	21	snow-white.	Marngle Creek, West Kimberley, Western Australia.
<i>Corvus ceciliae hartogi</i> Mathews, 1920. "Differs from <i>Corvus c. marngli</i> in having many of the feathers brown and not shining black."	Type not examined.				Dirk Hartog I., Western Australia.



## APPENDIX D.

DETAILED EXAMINATION OF AUSTRALIAN RACES OF *CORVUS*  
*CORONOIDES*.

	Number.	Locality.	Wing.	Culmen :		Base of feathers.
				Length.	Depth.	
Queensland	36	Cape York Pen. . .	295-354	46-61	19-26	snow-white
	1	Cooktown . . .	345	58	24	snow-white
	12	Normanton . . .	288-315	48-54	20-25	snow-white
	1	Normanton . . .	364	61	24	grey
	2	Shadbroke Isles . .	315, 344	56, 57	22, 23	snow-white
	6	Dawson River . . .	321-354	52-57	22-24	snow-white
Northern Territory	1	Daly River . . .	310	59	23	snow-white
	3	South Alligator R. .	329-357	59-62	24-27	snow-white
	5	Melville Isle . . .	333-351	56-61	24-26	snow-white
	1	Alexandria . . .	285	47	18	snow-white
	1	Brunette Downs . .	305	53	22	white
North-West Australia	1	Wyndham . . .	328	57	19	snow-white
	1	Admiralty Gulf . .	361	59	25	snow-white
	2	Forrest River . . .	330, 346	55, 58	24, 26	snow-white
	2	Napier Broome Bay .	350, 360	60, 62	24, 26	snow-white
	1	Derby . . .	335	52	23	snow-white
	1	Obogama, nr. Derby .	296	47	20	snow-white
	3	West Kimberley . .	306-316	49-51	21	snow-white
Western Australia	1	Murchison . . .	298	49	19	white
	3	Coolgardie . . .	316-345	55-63	24-25	white
	2	Carnarvon . . .	305, 340	47, 48	19, 21	white
	2	Port Cloates . . .	305, 328	50, 63	20, 23	snow-white
	1	Dirk Hartog I. . .	303	49	20	snow-white
	1	Perth . . .	316	51	23	grey
	5	Augusta . . .	298-325	46-52	20, 22	dark grey
	1	Warren River . . .	337	55	22	grey
	3	Albany . . .	330-347	53-56	22-23	grey
South Australia	1	Moorilyama . . .	340	57	27	snow-white
	1	Horse-shoe Bend . .	342	55	24	snow-white
	1	Wilgena . . .	322	55	24	snow-white
	3	Wantna Pilla Swamp, north of Spencer Gulf	330-343	53-60	24	snow-white
	1	Gawler Ranges . . .	330	49	22	snow-white
	3	Gawler Ranges . . .	325-347	55-57	22-25	grey to dark grey
	6	Normanville . . .	305-351	51-59	20-23	grey to dark grey
	2	Angus Plains (Adelaide)	315, 327	51, 54	21, 22	white and dark grey
	1	Kangaroo Isle . . .	295	49	19	grey
	New South Wales	2	Lismore . . .	296-350	54-55	23-26
4		Clarence Bay . . .	320-325	52-57	23-25	snow-white
1		Lithgow . . .	355	55	25	grey
1		Moree . . .	345	60	24	whitish grey
3		Walgett . . .	330-370	59-62	23-25	grey and whit- ish grey
1		Bundarra . . .	355	58	25	grey
1		Coonabarabran . .	338	59	25	grey



	Number.	Locality.	Wing.	Culmen:		Base of Feathers.	
				Length.	Depth.		
New South Wales (continued)	2	Belltrees (Seone)	355, 360	57, 59	23, 24	whitish grey	
	6	Gosford	345-379	56-62	22-25	grey to dark grey	
	1	Paramatta	332	55	23	dark grey	
	3	Sydney	354-365	60-62	24-26	grey to dark grey	
	8	Hay	310-358	49-56	21-25	grey to dark grey	
	5	Narandera	302-360	53-58	20-25	grey to dark grey	
	2	Broken Hill	315, 325	50, 53	20, 21	white	
	1	Delegate	331	57	23	grey	
	Victoria	3	Burrumbert, near Melbourne	323-342	52-53	22-23	2 dark grey, 1 whitish grey
		6	Wandella	318-355	52-59	22-24	grey to dark grey
7		Sandhill Lake, near Melbourne	332-357	52-57	20-23	grey to dark grey	
1		Bendigo	320	51	22	grey	
5		Lake Charm	324-340	50-55	20-23	4 dark grey, 1 grey	
1		Wonga Park, near Melbourne	327	56	22	dark grey	
1		Melton	346	60	25	dark grey	
1		Castlemaine	330	55	25	whitish grey	
11		Budgerum (near)	315-352	47-57	20-23	8 grey, 2 whitish grey, 1 dark grey	
7		Melbourne	305-360	52-60	22-25	grey to dark grey	
2		Bael Bael (near Melbourne)	326-328	53	21-22	grey	
Tasmania	7	Tasmania	336-357	60-67	23-25	grey to dark grey	